DRAFT

MASSACHUSETTS DIVISION OF FISHERIES & WILDLIFE (DFW) HABITAT CONSERVATION PLAN FOR PIPING PLOVER

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Contents

Tables and Figures

Acronyms and Abbreviations

°C	Celsius
°F	Fahrenheit
ACOE	U.S. Army Corps of Engineers
BO	biological opinion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMP	conservation & management permit
COI	Certificates of Inclusion
DEP	Massachusetts Department of Environmental Protection
DFW	Massachusetts Division of Fisheries and Wildlife
EA	environmental assessment
EAS	environmental action statement
EIS	environmental impact statement
ENF	environmental notification form
ESA	Endangered Species Act
FWS	U.S. Fish and Wildlife Service
Guidelines	state and federal guidelines
HCP	Habitat Conservation Plan
ITP	incidental take permit
MBTA	Migratory Bird Treaty Act
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MGL	Massachusetts General Law
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration's
OOC	Orders of Conditions
OSVs	over-sand vehicles
PIT tags	passive integrated transponders
Plan	Massachusetts Statewide Piping Plover Habitat Conservation Plan
PVA	population viability analysis
State Guidelines	1993, DFW published Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns and Their Habitats in Massachusetts
USC	U.S. Code
USDA-APHIS	U.S. Department of Agriculture Animal and Plant Health Inspective Service

Chapter 1
Introduction

1.1 Overview

The Massachusetts Statewide Habitat Conservation Plan (HCP) for Piping Plover (Plan) is intended to contribute to achieving the long-term viability of a robust Massachusetts population of the piping plover (*Charadrius melodus*) while maintaining and improving the public access, recreational opportunities, and economic activity associated with the state's beaches. This Plan is also intended to improve and streamline the state and federal permitting process for impacts on the piping plover, a state and federally protected species.

This Plan was prepared by the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife (DFW) in consultation with a variety of stakeholders with an interest in piping plover conservation and beach recreation. These stakeholders included representatives of local, state, and federal governments, landowners, beach managers, non-governmental environmental organizations, and beach user groups. The DFW held a series of facilitated stakeholder meetings with these parties to solicit input in development of the Plan.

1.1.1 Purpose and Goals

The purpose of this Plan is to advance piping plover conservation and recovery in Massachusetts while maintaining and improving the public access, recreational opportunities, and economic activity associated with the state's beaches.

In consultation with stakeholders, the DFW identified the following broad program goals for the Plan.

1. Develop and implement a framework to maintain a viable, robust[1] population of the piping plover in Massachusetts so as to contribute to the continued recovery of the Atlantic Coast piping plover population. This framework builds upon conservation efforts already being implemented by Massachusetts beach managers.
2. Maintain and increase community support for piping plover and barrier beach ecosystem conservation by increasing site-specific management flexibility and maintaining or improving the public access, recreational opportunities, and economic activity associated with the state's beaches.
3. Comply with state and federal Endangered Species Act (ESA) regulations while streamlining the permitting process and providing increased flexibility at the local, site level.

In addition to these broad program goals, the Plan contains specific biological goals and objectives that inform the monitoring and adaptive management program (see Chapter 4). As an HCP designed

[1] *Viable and robust* means able to persist near current population size (approximately 666 breeding pairs in 2013) or higher for the long term.

to meet the requirements of the federal ESA, this Plan describes covered activities that potentially expose piping plovers to "take"[2] which will be authorized by an incidental take permit (ITP) issued to the DFW by the U.S. Fish and Wildlife Service (FWS) in association with this Plan. In addition, this Plan will function as an umbrella plan whereby incidental take coverage can be extended via Certificates of Inclusion (COI) to approved landowners and beach managers that (1) engage in the covered activities described in the Plan, (2) meet the eligibility and COI application requirements described in the Plan, and (3) agree to implement the Plan and required ITP conditions. The process through which the DFW can extend this take coverage to *plan participants* via COI is described in Section 5.4.2, *Plan Participants*. This permit structure will allow plan participants to receive federal incidental take coverage via the DFW's ITP; and as a result, will not need to obtain a separate ITP for their activities. This Plan describes those specific conservation actions that the DFW and plan participants will undertake to minimize impacts to the piping plover and its habitat and to mitigate the unavoidable impacts of covered activities.

Because the piping plover is also state-listed as threatened, pursuant to the Massachusetts Endangered Species Act (MESA) (Massachusetts General Law [MGL] Chapter [c.] 131A) and its implementing regulations (321 CMR 10.00), the conditions required of plan participants under this HCP are also designed to meet the standards for a MESA conservation and management permit (CMP). In part to fulfill these MESA permitting requirements, this HCP is designed such that the benefits of the conservation actions to the Massachusetts piping plover population will outweigh the impacts from covered activities, thereby resulting in a "net-benefit" to the species in Massachusetts.

Because the eligibility requirements, covered activities, and minimization and mitigation measures are all described in the Plan, and because plan participants will not have to develop individual site-specific HCPs, it is expected that the Plan will greatly streamline the permitting process, saving time and money. Because this Plan identifies conservation priorities at a broad geographic scale, it will improve piping plover conservation by focusing conservation actions where they can do the most good, resulting in more efficient and effective conservation for the species.

1.1.2 Background

Piping plovers are small, sand-colored shorebirds that nest on sandy, coastal beaches along the eastern shore of North America from South Carolina to Newfoundland. In 1986, the United States Atlantic Coast population was listed as threatened by the FWS with an estimated population of approximately 800 breeding pairs (FWS 1996a). Massachusetts also listed the piping plover as threatened pursuant to MESA, with an estimated 140 breeding pairs present in 1986 (DFW Unpublished Data). Since the listing, the DFW and other stakeholders have implemented aggressive beach management measures to help recover the Atlantic Coast population of the piping plover.

This Plan builds on over two decades of successful management and recovery of the Massachusetts piping plover population, undertaken by the DFW in partnership with landowners and beach managers throughout the state. In 1993, the DFW published *Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns and Their Habitats in Massachusetts* (State Guidelines) (DFW 1993) (see Appendix 1). The State Guidelines describe management techniques to prevent

[2] *Take* as defined by the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Incidental take* is take that is incidental to, and not intended as part of, an otherwise lawful activity.

disturbance of nesting birds, trampling of nests, and restrictions on the use of over-sand-vehicles (OSVs) when unfledged chicks are present. The State Guidelines, which closely mirror similar federal guidelines (FWS 1994, FWS 2015) (Federal Guidelines), provide recommended management actions to avoid take of piping plovers. At present, every major plover nesting beach and >95% of breeding pairs in Massachusetts are managed in general accordance with the both the State and Federal Guidelines (Guidelines[3]), including virtually all sites with significant OSV use.

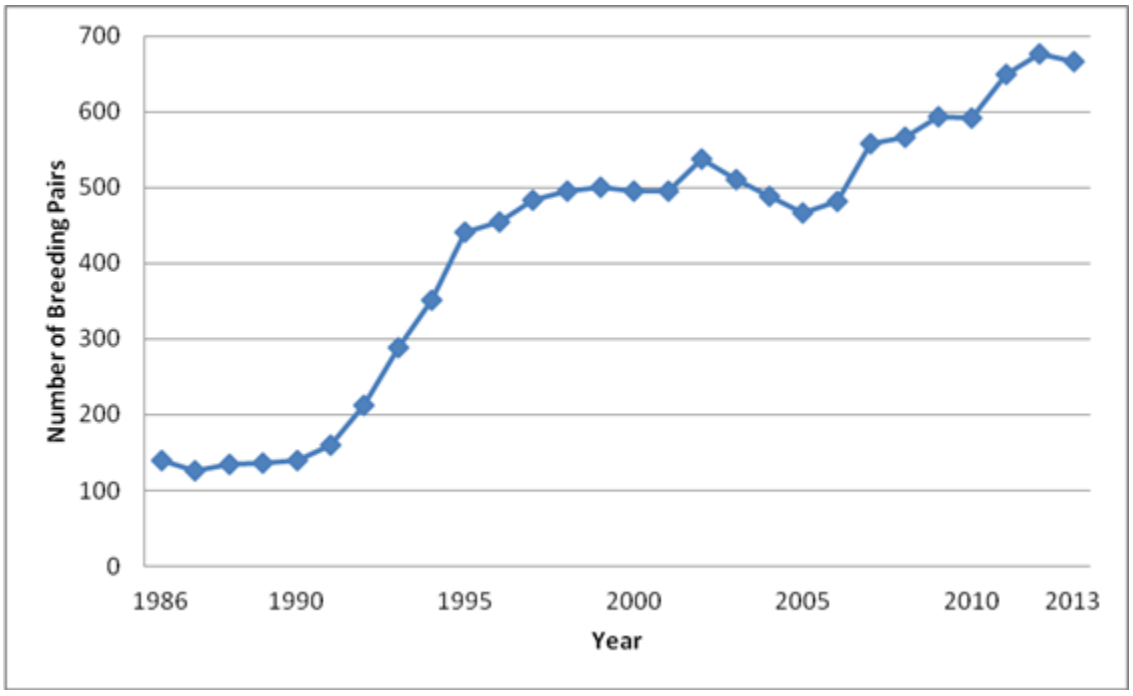
This commitment to piping plover management on the part of beach operators and owners, including many municipalities, has led to a significant increase in the Massachusetts piping plover population. From 1986–2013, the population increased from an estimated 139 to 666 breeding pairs (Figure 1-1). As of 2013, the Massachusetts piping plover population alone exceeded the FWS population size recovery goal for the New England recovery unit, set at 625 breeding pairs (FWS 1996a).

This almost five-fold increase in the piping plover population over the last 25 years has led to increased restrictions on recreational beach use at some sites because of the need to avoid take and challenging conflicts with reasonable and routine beach use. Some examples of these conflicts are provided below.

- There are increasing incidences of piping plover nests in busy beach parking lots or chicks attempting to cross active roads. To avoid take of these plovers, beach managers must significantly disrupt recreational beach use (for example, through parking lot or road closures).
- As plover populations expand along beaches, the length and width of beach that must be demarcated with symbolic fencing to protect breeding birds must also expand; as a result, larger sections of beach are closed to recreational use.
- The larger plover population is characterized by an increase in the number of late-season (i.e., post-July 15) nests, resulting in an increase in recreational restrictions during the busy summer recreational season. This pattern is particularly challenging for the management of small beaches and high-use beaches in or near urban areas.
- A larger, more robust, plover population and adherence to the Guidelines translates into significant reductions in the amount of area available to OSVs and the duration of OSV closures. For example, under the current Guidelines, the presence of one or two late nesting piping plover pairs situated near an OSV access point can lead to closure of miles of beach that are free of nesting plovers and that would otherwise be open for mid-late summer OSV use.

[3] Throughout the remainder of this document the state and federal guidelines are collectively referred to as the "Guidelines."

Figure 1-1. Number of Breeding Pairs of Piping Plover in Massachusetts, 1986–2013[1]



[1] Beginning in 1990, the numbers shown in the chart are the "Adjusted Total Count" (see Chapter 2).

Community and landowner cooperation and adherence to the Guidelines has led to baseline conditions of a larger piping plover population. In turn, an increase in the number, distribution, and nesting period of piping plovers has led to greater restrictions on a wide array of recreational and economic activities associated with the state's beaches. This situation threatens to erode community support for piping plover conservation, potentially jeopardizing the progress towards piping plover recovery that has occurred during the past 25 years.

Providing incidental take authorization through the Plan will greatly increase flexibility for beach managers and enhance recreational opportunities. The Plan is designed to allow covered activities that will have minimal impact on the Massachusetts piping plover population. Implementation of the Plan will reduce conflict and increase community support for long-term piping plover conservation.

1.2 Scope of the Habitat Conservation Plan

This section defines the key elements of the Plan—covered activities, geographic scope, covered species, conservation actions, permit term, and permittees.

1.2.1 Covered Activities

A primary goal of this Plan is to implement management actions to benefit piping plovers and their habitats to obtain an ITP to implement certain covered activities. These covered activities are expansions of recreational activities and beach operations and may also be thought of as deviations from ongoing piping plover conservation measures being implemented consistent with the Guidelines. The activities covered by the Plan are summarized here and described in more detail in Chapter 3. Note that the Plan contains strict statewide limits on the numbers of piping plovers that

may be exposed to covered activities and the limits become more restrictive if the statewide piping plover population declines for any reason. In addition, the Plan places site-specific limits on covered activities such that generally no more than 15 percent of breeding pairs at a given site[4] may be exposed to covered activities.[5] In addition, the risk of take associated with the covered activities will be minimized via conditions on each covered activity and site-specific impact minimization measures, and all anticipated take will be offset via a robust mitigation strategy (see Chapter 4).

The activities covered under the Plan are summarized below and are described in more detail in Chapter 3.

1. **Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks**. Current Guidelines prohibit road use and parking where unfledged chicks are present in order to avoid take. Under this Plan, driving past a limited number of unfledged chicks will be permitted subject to certain impact minimization procedures (see Chapter 3, Section 3.2.1).
2. **Recreation Management and Beach Operations.** This covered activity will involve three scenarios.

a. *Recreation and Beach Operations Associated with Reduced Symbolic Fencing Around Nests.* Current Guidelines require 50-yard buffers around established nests. Under this HCP, fencing buffers would be reduced, and recreational and beach operational activities would be permitted in those areas that would otherwise have been fenced under the Guidelines.

b. *Recreation and Beach Operations Associated with Reduced Proactive Symbolic Fencing of Piping Plover Habitat.* As currently required by the Guidelines, proactive symbolic fencing is fencing that is generally established prior to the plover breeding season to preserve habitat for piping plovers. Under this Plan, some reduction in the extent of proactive symbolic fencing would be allowed, subject to certain limitations. In addition, recreational and beach operational activities would be permitted in those areas that would otherwise have been fenced under the Guidelines.

c. *Recreation and Beach Operations at Piping Plover Nest Sites with Nest Moving*. Nest moving is currently not permitted under the Guidelines; therefore, beach areas such as parking lots or major access points must be closed if a plover nest is present. Under this Plan, these beach areas may stay open for use if a plover nest is present, subject to certain limitations. In such cases, closures during the egg laying period and nest moving may be required as impact minimization procedures to reduce the risk of nest destruction or abandonment.[6]

3. **OSV Use in the Vicinity of Unfledged Piping Plover Chicks**. According to the Guidelines, OSV use is permitted, subject to certain limitations, prior to egg hatching and after chick fledging.[7] Under the Plan, escorted OSVs will be permitted to drive past a limited number of unfledged piping plover broods subject to impact minimization procedures to reduce the risk of chick mortality (see Chapter 3).

[4] For definition of "site" see Chapter 5.

[5] The DFW may increase the allowable exposure to 30% at up to five sites per year (see Section 5.2.2.3).

[6] Nest moving has been demonstrated to effectively prevent piping plover nest loss due to flooding (see Chapter 3).

[7] Chicks are considered to have fledged when they are able to sustain flight.

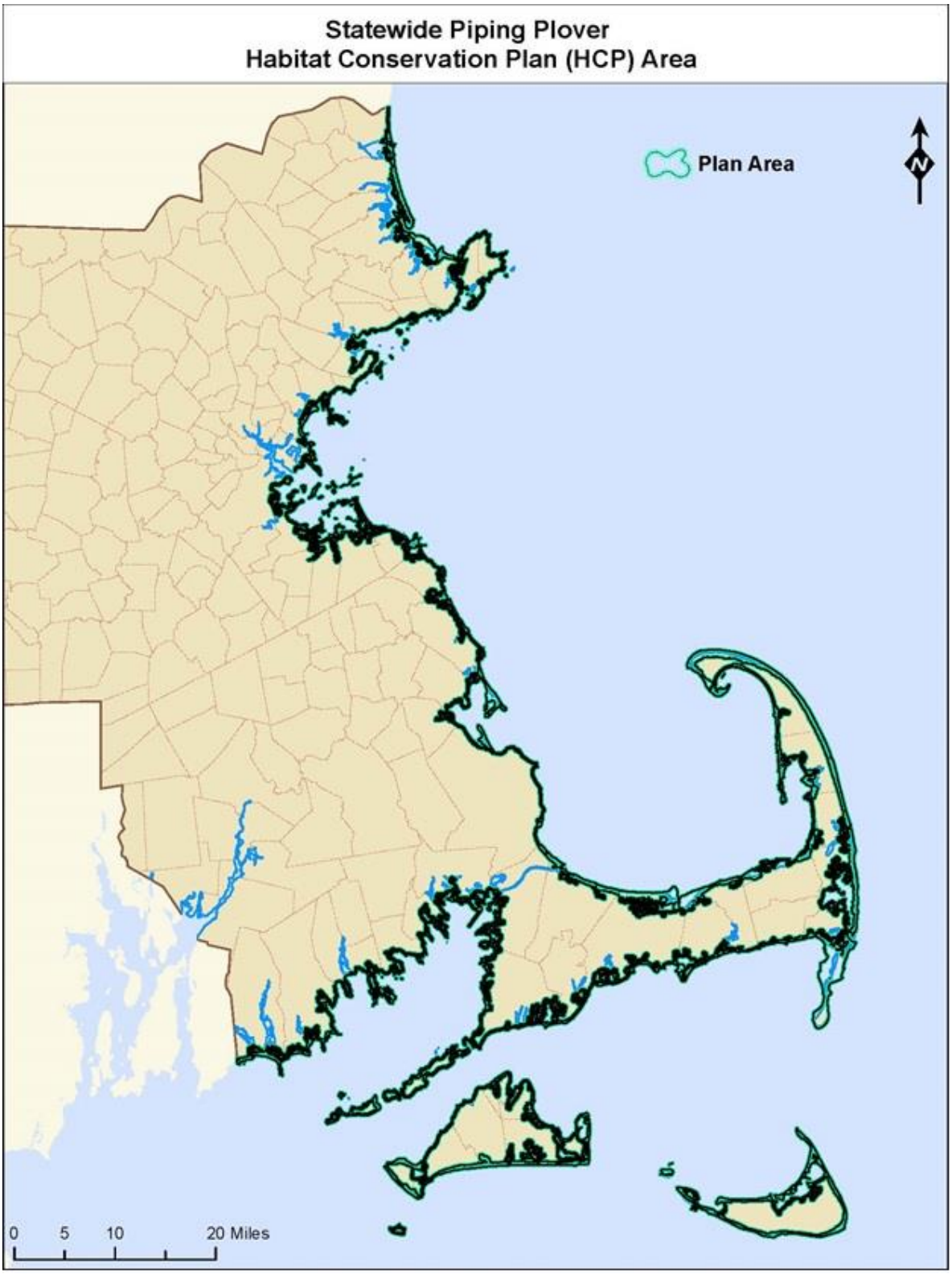
1.2.2 Geographic Scope

The plan area is the area in which plan participants will conduct covered activities and where conservation actions will be implemented. Under this HCP, the plan area includes an approximately 300-yard wide zone along the entire coastline of Massachusetts, with the exception of one small area in Mount Hope Bay. This includes all currently and recently occupied piping plover habitat delineated as priority habitat by the DFW (321 CMR 10.00), as well as other beach and dune areas that could support breeding piping plovers in the future. As both natural processes (such as erosion and accretion) and human activities (such as beach nourishment and the disposition of dredge spoils) can result in the creation, loss, and shifting of piping plover breeding habitat over time, the plan area is defined so as to automatically adjust to include a 300-yard zone as measured from the shifting coastline.

This area is intended to capture all currently suitable Massachusetts piping plover breeding habitat, as well as the area within which additional piping plover breeding habitat could develop in the foreseeable future due to the dynamic nature of the coastline. This delineation of the plan area ensures that both current and future managers of piping plover habitat will have the ability to opt in to the Plan for the duration of the requested permit (see Section 1.2.5, *Permit Term*).

The existing plan area includes 150,000 acres of land, of which approximately 29,000 acres are currently classified as beach and coastal dune, the land cover types most associated with piping plover breeding habitat. It also contains approximately 43,531 acres of current or recently occupied piping plover habitat delineated as priority habitat by the DFW. Additional information about the plan area is provided in Chapter 2.

Figure 1-2. Plan Area



1.2.3 Covered Species

This Plan contains conservation actions that will benefit a variety of plant and animal barrier beach species, including a number of tern species. However, piping plover is the only species specifically addressed by this Plan and for which the DFW is seeking incidental take coverage.

Three other species that are federally listed or that occur in the plan area: the roseate tern (*Sterna dougallii dougallii*), red knot (*Calidris canutus rufa*), and Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) (see Table 1-1). However, these species are not proposed for inclusion in this HCP as the DFW believes that incidental take from covered activities is unlikely for these species. There is little overlap between piping plover and roseate tern breeding habitat, and impacts from covered activities on roseate tern staging areas are not expected to result in take given the current regulatory approach (see Chapter 3). There is some overlap between piping plover breeding habitat and red knot migratory/staging habitat; however, the peak staging season for red knots during fall migration is in mid-to late August, following the piping plover nesting season. Therefore, it is unlikely for covered activities causing incidental take of plovers to impact red knots. The Northeastern beach tiger beetle has an extremely restricted distribution in Massachusetts, limited to federal land and a few private properties where implementation of the covered activities is not anticipated. As these species are not covered by this Plan, the DFW will not issue COIs for activities that would result in take of these or other federally listed species. The DFW and plan participants will need to attain ESA compliance for these species should take become an issue in the future.

Least Terns (*Sterna antillarum*) occur in the plan area and their habitat overlaps extensively with piping plover habitat. Least Terns are state listed as a species of special concern pursuant to MESA, but are not federally listed (see Table 1-1). The DFW is not seeking coverage from the FWS for the Least Tern, because federal listing of this species is considered unlikely. However, as part of the process of obtaining a COI under this Plan, plan participants will be required to achieve compliance under MESA for the Least Tern and other state-listed species by avoiding take or obtaining a CMP, as applicable (see Chapter 5). The DFW has prepared a guidance document that explains how plan participants can achieve MESA compliance for the Least Tern, through take avoidance, impact minimization, and/or mitigation. This guidance document will be made available for public review and comment as part of the Massachusetts Environmental Policy Act review that will be carried out in parallel to public comment period for the National Environmental Policy Act (NEPA) review of the draft HCP.

There are two fish species that are federally and state listed as threatened and endangered in coastal and fresh waters of Massachusetts, the shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic sturgeon (*Acipenser oxyrinchus*). However, the focus of the Plan is on barrier beach habitat, and does not include the coastal waters utilized by these fishes; therefore, they are not proposed for inclusion in the Plan.

The common tern (*Sterna hirundo*) occurs in the plan area and is state-listed as a species of special concern pursuant to MESA. There is relatively little overlap of common tern and piping plover breeding habitat and somewhat greater overlap with common tern migration and staging areas. As is the case for other state-listed species that may occasionally co-occur with the piping plover, plan participants will have to achieve concurrent compliance with MESA when applying for a COI under the ITP (see Chapter 5).

It is possible that this Plan could be amended at a future date to include coverage for one or more of the species listed in Table 1-1, as described in the Plan amendment process in Chapter 5. In the

interim, because these species will not be covered by the HCP and ITP, the DFW and plan participants will need to avoid take of these species (if listed) or, if take is unavoidable, comply separately with the ESA, MESA, and the state-listed species provisions of the Massachusetts Wetlands Protection Act, including any required filings, approvals, and permits for specific projects or activities, as applicable (see Section 1.3, *Regulatory Setting*).

Table 1-1. Federally Listed Species in the Plan Area

Species	Federal Status	State Status	Notes
Birds			
piping plover (*Charadrius melodus*)	T	T	Covered by Plan.
roseate tern (*Sterna dougallii dougallii*)	E	E	Little overlap between piping plover and roseate tern breeding habitat (greater overlap with roseate tern migratory/staging habitat). Impacts from covered activities on roseate tern staging areas expected to minimal given current regulatory approach (see Chapter 3). Separate compliance required for activities with the potential to take roseate tern.
red knot (*Calidris canutus rufa*)	T	--	Some overlap between piping plover breeding habitat and red knot migratory/staging habitat; however, the peak staging season for red knots during fall migration is in mid-to late August, following the piping plover nesting season. Therefore, there is unlikely to be significant overlap with plover nesting. There is little information and considerable uncertainty on whether covered activities would result in take of red knots at staging areas. Separate ESA compliance will be required for actions with the potential to take red knot.
Invertebrates			
Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)	T	E	The beetle has an extremely restricted distribution in Massachusetts, limited to federal land and a few private properties where implementation of the covered activities is not anticipated.

Source: DFW 2014.
T=threatened, E=endangered, -- =no listing status
Note: There are no federally listed plant, mammal, amphibian, or reptile species in the plan area.

1.2.4 Conservation Strategy

The Plan outlines specific conservation actions designed to advance piping plover conservation, contribute to species recovery, and minimize and mitigate the effects of the covered activities (see Chapters 3 and 4).

- Management and monitoring in accordance with the Guidelines—As discussed above, implementation of management in accordance with the Guidelines is thought to be the leading factor contributing to significant piping plover population growth in Massachusetts in recent decades (Figure 1-1). Intensive monitoring of population size and productivity provides critical information for management decisions. The Plan incorporates a commitment to continue this management and monitoring. Additional conservation actions such as minimization and mitigation will build on this foundation of protective management.

- Minimization protocols when conducting covered activities—The Plan contains specific procedures to be followed when carrying out the covered activities. These procedures are an integral part of the covered activities, and are designed to minimize impacts and substantially reduce the risk of incidental take. For example, intensive monitoring of unfledged chicks by qualified monitors, along with escorts for OSVs when they are in the vicinity of unfledged chicks, will substantially reduce the risk of chick injury or mortality due to covered activities.
- Mitigation Measures—Although impacts will be minimized to the greatest extent practicable, unavoidable impacts that may reduce piping plover productivity (i.e., the number of fledglings produced in a given year) will be mitigated through mitigation actions designed to benefit the piping plover population and provide a net increase in productivity. These measures will include selective predator management, enhanced monitoring and enforcement, public outreach, conservation research, and habitat improvements. These mitigation measures are designed to more than fully offset the impacts associated with covered activities such that implementation of the Plan will result in a net benefit to the piping plover population in Massachusetts. While mitigation requirements are defined differently under Section 10 of the federal ESA and MESA, the measures included in this Plan will meet the statutory requirements of both the federal and state laws. See Chapter 4, Section 4.3.2, for a more detailed description of the proposed the mitigation measures and how they will satisfy these federal and state requirements.

1.2.5 Permit Term

The DFW is seeking a 25-year ITP from the FWS. The DFW will implement all components of the Plan during this period, including all conservation actions, and this is the period during which a net benefit to the plover population will be realized. A 25-year permit term will provide a predictable framework for the permitting of covered activities and Plan implementation. This predictability will facilitate beach management planning and significantly reduce the risk of large-scale, unplanned disruptions in recreational and economic activity associated with piping plover nesting beaches. The 25-year permit term will also ensure enough time to fully implement the proposed conservation actions and to take proactive measures to improve them through the adaptive management program described in the Plan (see Chapter 4).

As described in Chapter 3, this Plan contains a strict framework for linking the number of unfledged piping plover chicks, nests, and territories that can be exposed to take in a given year to changes in the statewide piping plover population over time (see Table 3-2). Even though the Plan calls for all impacts associated with the covered activities to be fully mitigated through conservation actions, such as targeted predator management, the allocation of take authorizations linked to piping plover population size functions as a "fail safe" mechanism to ensure that the piping plover population remains viable and robust, even in the event of changed or unforeseen circumstances. This important feature of the Plan provides additional support for the DFW's request for a 25-year permit.

1.2.6 Plan Participants

Any nonfederal land owner that implements the covered activities described in this Plan in piping plover habitat is eligible to apply for a COI to receive incidental take coverage under the DFW's HCP and ITP. Federal agencies, such as the FWS (national wildlife refuges), National Park Service (Cape Cod National Seashore), or U.S. Army Corps of Engineers, are not eligible as they achieve ESA compliance through the Section 7 process (see Section 1.3, *Regulatory Setting*). It is anticipated that

most plan participants will include owners and operators of recreational beaches open to the public, such as municipalities, state agencies, and nonprofit environmental organizations. Other potential participants include private beach clubs and private beach owners.

1.3 Regulatory Setting

A number of federal and state laws regulate the types of activities that can occur on the beaches of Massachusetts. These laws address protection of threatened or endangered species (federal and state law), regulation of recreational activities (state law), and development. A summary of relevant laws is provided below. All measures incorporated into this Plan would be conducted in compliance with federal, state, and local laws and regulations.

1.3.1 Federal Endangered Species Act

Section 9 of the ESA prohibits the take of any endangered or threatened species of fish or wildlife listed under the ESA. Under the ESA, the term *take* means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect species listed as endangered or threatened or to attempt to engage in any such conduct. Under Section 10 of the ESA, the FWS may authorize, under certain terms and conditions, any taking otherwise prohibited by Section 9(a)(1)(B) if such taking is incidental to, and not the purpose of, an otherwise lawful activity. This Section 10 take authorization is known as an ITP.

In the ESA's regulatory definition of take, *harass* means an intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to, breeding, feeding, or sheltering. *Harm* in the ESA's definition of take means an act that actually kills or injures wildlife. Such acts may include significant habitat modification or degradation that, as a result, actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

To qualify for an ITP, a nonfederal landowner or land manager must develop, fund, and implement an FWS-approved HCP. The HCP must specify the following information described in the ESA Section 10(a)(2)(A) and 50 Code of Federal Regulations (CFR) 17.22(b)(1) and 50 CFR 17.32(b)(1).

- The impact that will likely result from such taking.
- The measures the applicant will undertake to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such measures, and the procedures to be used to deal with unforeseen circumstances.
- The alternative actions the applicant considered that would not result in take and the reasons why such alternatives are not proposed to be utilized.
- Such other measures that the Director of the FWS may require as necessary or appropriate for purposes of the HCP.

The FWS will issue an ITP if it finds that the following criteria of the ESA, Section 10(a)(1)(B) and 50 CFR 17.22(b)(2) and 50 CFR 17.32(b)(2) are met.

- The taking will be incidental to otherwise lawful activities.

- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such takings.
- The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided.
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.
- The applicant has met the measures, if any, required by the Director of the FWS as being necessary or appropriate for the purposes of the plan.
- The Director of the FWS has received such other assurances, as he or she may require, that the plan will be implemented.

Section 7 of the ESA requires all federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of habitat critical to such species' survival. To ensure that its actions do not result in jeopardy to listed species or in the adverse modification of critical habitat,[8] each federal agency must consult with the FWS or the National Marine Fisheries Service (NMFS)—or both—regarding federal agency actions that may affect listed species. The issuance of the ITP for this Plan is a federal action that triggers a Section 7 consultation. Consultation typically begins when a federal agency submits a written request for initiation to the FWS or NMFS, along with the agency's biological assessment of its proposed action, and when the FWS or NMFS accepts that biological assessment as complete. Unless the FWS or NMFS concurs with the agency's determination that the action is not likely to adversely affect any listed species, the FWS or NMFS must prepare a written biological opinion describing how the agency's action will affect the listed species and its critical habitat. For this Plan, the FWS will consult internally (with itself) to comply with Section 7 of the ESA. This HCP serves as the biological assessment for the internal consultation.

Any project with a federal lead agency or federal involvement (e.g., a federal permit, federal funding, or a project on federal land) must obtain take authorization through consultation with the FWS under Section 7 of the ESA rather than Section 10.

1.3.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 United States Code [USC] 703–712), prohibits the take of migratory birds. A list of birds protected under MBTA implementing regulations is provided at 50 CFR 10.13, and includes the piping plover. Unless permitted by these regulations, under the MBTA it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product. The MBTA provides no process for authorizing the incidental take of MBTA-protected birds; however, the FWS has a policy of allowing an ITP to serve as a special purpose permit under 50 CFR 21.27 for the take of listed, migratory birds that are addressed in an HCP (FWS 1996b). As explained above, DFW does not anticipate incidental take of migratory birds, other than piping plovers. However, birds not

[8] *Critical habitat* is defined as specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species, and that have been formally designated through formal rule-making.

covered by the Plan will benefit from the conservation actions described in this Plan. The DFW will require that the mitigation and management actions described in this Plan, as well as the impact minimization and mitigation measures to be implemented by plan participants, will be conducted so as to achieve MESA compliance for least terns, and potentially other state listed bird species (e.g., common tern). Some components of the mitigation program under this Plan may result in selective intentional take of avian predators, such as American crows. However, DFW will comply with the conditions of the FWS depredation order (50 CFR 21.43), which applies to blackbirds, cowbirds, grackles, crows, and magpies. When other MBTA-protected species are targeted by the mitigation, a MBTA permit will be obtained by the entity doing the mitigation.

1.3.3 National Environmental Policy Act

NEPA is a procedural law that requires federal agencies to consider environmental impacts in the decision-making process for federal actions. The Council on Environmental Quality (CEQ) regulations define, *major federal action* as those actions with, "effects that may be major and which are potentially subject to Federal control and responsibility," including, "projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies." If a federal action has the potential to significantly impact the human environment, federal agencies must prepare an environmental assessment (EA) to assess potential impacts. If any impacts to the human environment are found to be significant, the federal agency must then prepare an environmental impact statement (EIS). NEPA's requirements are primarily procedural rather than substantive in that NEPA requires the disclosure of environmental effects and mitigation possibilities but includes no requirement to mitigate.

Issuance of an ITP under the ESA is a federal action subject to NEPA compliance. Although ESA and NEPA requirements overlap considerably, the scope of NEPA goes beyond that of the ESA by considering the impacts of a federal action not only on fish and wildlife resources, but also on other resources such as water quality, air quality, and cultural resources. This ensures that federal agency has before it the best possible information to make an "intelligent, optimally beneficial decision" and to ensure that the public is fully apprised of any environmental risks associated with the preferred action. To satisfy NEPA requirements, the FWS has released a draft EA that accompanies this draft HCP.

1.3.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (54 USC 300101 et seq.[9]), requires federal agencies to take into account the effects of their actions on properties eligible for inclusion in the National Register of Historic Places. *Properties* are defined as cultural resources, which include prehistoric and historic sites, buildings, and structures that are listed on or eligible for listing on the National Register of Historic Places. An undertaking is defined as a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; those requiring a federal permit, license or approval; and those subject to state

[9] The National Historic Preservation Act was previously codified at 16 USC 470 *et seq*.

or local regulation administered pursuant to a delegation or approval by a federal agency. The issuance of an ITP is an undertaking subject to Section 106 of the NHPA. The FWS has determined that the area of potential effects for the present undertaking is that area where covered activities may result in take of species. The NHPA and the potential effects of the conservation strategy on resources subject to the NHPA are discussed in detail in the EA.

1.3.5 Massachusetts Endangered Species Act

MESA was enacted in December 1990 (MGL c. 131A). Implementing regulations were promulgated in 1992 and most recently revised and implemented as of October 15, 2010 (321 CMR 10.00). MESA protects rare species and their habitats by prohibiting the take of any plant or animal species listed as endangered, threatened, or special concern by the DFW. Under MESA, *take* is defined as

> in reference to animals to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat.

Permits for the take of rare species for scientific, educational, conservation, or management purposes can be granted by the DFW. MESA and its implementing regulations establish procedures for the listing and protection of rare plants and animals and outline project review filing requirements for projects or activities that are located within priority habitat. MESA regulations also provide clear review timelines and establish an appeal process for agency actions. If during the MESA project review it is determined that a project will result in a take of a state-listed species, the project may be eligible for a CMP (321 CMR 10.23). To be eligible for a CMP, the applicant must (1) assess alternatives to both temporary and permanent impacts to state-listed species. Thus, certain projects that can be redesigned to avoid a take may not be eligible for a CMP. The permit applicant must also (2) demonstrate that a proposed project will impact an insignificant portion of the local population of an affected state- listed species. Finally, the applicant must (3) design and implement a conservation and management plan that provides a long-term net benefit to the conservation of the affected state-listed species.

Along with their COI applications, plan participants will file a MESA checklist and CMP application with the DFW. Complying with the impact minimization and mitigation measures described in the Plan will greatly streamline the CMP application process. To ensure MESA compliance, the DFW will issue a CMP Permit to plan participants coincident with confirmation of the COI under the ITP. To the extent that other state-listed species are present and could be impacted by covered activities, the DFW will work with plan participants to ensure that implementation of covered activities is conditioned to avoid take of state-listed species, or that the plan participant applies for and obtains a CMP covering other state-listed species as necessary to ensure MESA compliance.

1.3.6 Massachusetts Environmental Policy Act

The Massachusetts Environmental Policy Act (MEPA) (MGL c.30 s.61; 301 CMR 11.00) requires that state agencies study the environmental consequences of their actions, including permitting and financial assistance. It also requires them to take all feasible measures to avoid, minimize, and mitigate damage to the environment. MEPA further requires that state agencies "use all practicable means and measures to minimize damage to the environment," by studying alternatives to the

proposed project, and developing enforceable mitigation commitments, which will become conditions for the project if and when they are permitted.

MEPA applies to projects that exceed certain review thresholds and that require a state agency action; specifically, that are either proposed by a state agency or are proposed by municipal, nonprofit or private parties and require a permit, financial assistance, or land transfer from state agencies. MEPA review is not a permitting process. MEPA requires public study, disclosure, and development of feasible mitigation for a proposed project. It does not pass judgment on whether a project is environmentally beneficial, or whether a project can or should receive a particular permit. Those decisions are left to the permitting agencies. MEPA review occurs before permitting agencies act, to ensure that they are fully cognizant of the environmental consequences of their actions. MEPA review provides the mechanism through which this information collection and mitigation mandate is executed. MEPA empowers the state Secretary of Energy and Environmental Affairs to oversee the review process. The process is public and encourages comments from citizens and from state, regional, and local agencies.

The DFW intends to file a MEPA environmental notification form (ENF) for the Plan and hold a MEPA public comment period concurrent with NEPA public comment period.

1.3.7 Massachusetts Wetlands Protection Act

In accordance with the implementing regulations of the Massachusetts Wetlands Protection Act, activities in wetland resource areas such as dunes, beaches, tidal flats and coastal banks (including storm damage prevention and the protection of wildlife habitat), are subject to performance standards. These regulations are implemented by local conservation commissions as overseen by the Department of Environmental Protection's Division of Wetlands and Waterways. Orders of Conditions (OOC) regulate proposed activities to minimize or prohibit impacts to wetland resource areas.

Some covered activities proposed in the Plan will require an OOC (e.g., OSV use and beach raking). Plan participant take authorizations and CMPs will not be valid until such time as the plan participant obtains the required OOCs and complies with all other applicable federal and state laws.

1.3.8 Executive Order for Regulation of Off-Road Vehicle Use on Public Lands Containing Coastal Wetlands Resources

Massachusetts Executive Order 190 (1980) for the Regulation of Off-Road Vehicle Use on Public Lands Containing Coastal Wetlands Resources directs state agencies to balance the competing uses of public lands and minimize the degradation of wetlands resources due to off-road vehicle use through management and monitoring. The Guidelines for Barrier Beach Management in Massachusetts (DFW 1994) advance this executive order. This Plan adheres to these State Guidelines and is therefore in compliance with this executive order.

1.4 Overview of the HCP Planning Process

Development of this Plan was led by the DFW with close coordination and technical support from the FWS. The Plan was prepared by the DFW and a consulting team from ICF International with expertise in HCP preparation and implementation. The Plan was also reviewed and coordinated

with an active stakeholder group, as described below. The stakeholder group was facilitated by staff from the Consensus Building Institute.

1.4.1 Stakeholder Group

The stakeholder group was formed in 2014 and was comprised of 20 participants including federal and state agencies, environmental groups, beach managers, town leadership, beach landowners, beach users, and other interested parties. Participants represented a variety of interests, including conservation organizations, recreational organizations, and business interests. The structure of the group was informal, with new participants joining as the process unfolded and varying levels of participant involvement. The stakeholder group met regularly to identify HCP goals and objectives, identify areas of interest, determine milestones for completion of the Plan, and review draft HCP materials. The group played an advisory role to the DFW; the group did not necessarily seek consensus on all issues, and participation does not necessarily signal endorsement of this Plan or all of its components. Table 1-2 provides a list of all organizations that participated in one or more of the stakeholder group meetings.

Table 1-2. Participants in the Stakeholder Group

Organization
Town of Barnstable
Town of Chatham
Town of Dennis
Town of Orleans
Town of Plymouth
Town of Sandwich
Town of Yarmouth
Biodiversity Works
MassAudubon
Massachusetts Beach Buggy Association
Nantucket Conservation Foundation
The Trustees of Reservations
Massachusetts Department of Conservation and Recreation
Massachusetts Department of Environmental Protection (wetlands section)
Massachusetts Division of Fisheries and Wildlife
Massachusetts Division of Marine Fisheries
United States Fish and Wildlife Service (national wildlife refuges)
United States Fish and Wildlife Service (ecological services)
Consensus Building Institute
ICF International

1.5 Document Organization

This HCP contains the following chapters and appendices.

- Chapter 1, *Introduction*, discusses the background, purpose, and objectives of the Plan, summarizes the Plan framework, and reviews the regulatory setting.
- Chapter 2, *Environmental Conditions*, discusses the existing conditions in the plan area, including current plover management measures and population status.
- Chapter 3, *Covered Activities and Impact Analysis*, describes the activities covered under the Plan and their impacts, including the anticipated level of incidental take.
- Chapter 4, *Conservation Strategy*, summarizes the conservation actions, describes the specific actions to be implemented to mitigate the impacts of the covered activities and contribute to species recovery, and describes the monitoring and adaptive management plan.
- Chapter 5, *Plan Implementation, Assurances, and Funding,* details the administrative requirements associated with Plan implementation, the roles and responsibilities of the DFW, the FWS, and plan participants. The chapter reviews the costs associated with Plan implementation and the funding sources proposed to pay for those costs. This chapter also describes the regulatory protections for the state and plan participants in the event of changed circumstances and unforeseen circumstances, as well as the procedures for modifying or amending the Plan.
- Chapter 6, *Alternatives to Take*, presents the required analysis of alternatives to take of covered species.
- Chapter 7, *Literature Cited*, is a bibliography of references cited in the text.

Chapter 2
Environmental Conditions

2.1 Introduction

This chapter presents the environmental setting and land uses that characterize the plan area and the physical and biological resources of the plan area that are relevant to the piping plover. It describes in further detail how the boundaries of the plan area introduced in Chapter 1, *Introduction*, were delineated and the baseline conditions on which the impact analyses (Chapter 3, *Covered Activities and Impact Analysis*) and conservation strategy (Chapter 4, *Conservation Strategy*) are based. In this chapter, *Physical Resources* includes a description of the topography, surficial geology, and climate in the plan area. *Biological Resources* includes a description of land cover categories that support piping plover and piping plover ecology, life history, and distribution, as well as the existing conservation actions that are currently in place to prevent take and protect the piping plover and its habitat. Finally, the *Land Uses* section summarizes the land ownership and management of the beaches on which most piping plovers occur in the state.

2.2 Physical Resources

2.2.1 Plan Area

The plan area includes the entire coastline of Massachusetts, except for a small area in Mount Hope Bay in the vicinity of Fall River (in total, approximately 1,774 linear miles of coastline). The overall plan area is shown in Figure 2-1 and is divided into sub-areas A through E for the purposes of providing more detailed maps (see Figure 2-2 through Figure 2-7). As described in Chapter 1, *Introduction*, the plan area encompasses not only currently suitable or occupied piping plover habitat, but also a broader geographic area within which additional piping plover breeding habitat could develop within the permit term due to the dynamic nature of the coastline. The plan area is defined to include all areas of priority habitat for piping plover delineated by the DFW pursuant to MESA as well as a 300-yard buffer zone around those priority habitats. The plan area is also defined to include a zone extending 300 yards inland from the coastline. The 300-yard zone is always measured from the existing coastline, so it automatically adjusts as the coastline shifts due to erosion or accretion.

Priority habitat for piping plover was delineated by DFW biologists in accordance with state regulations at 321 CMR 10.12. It is based on breeding records of piping plover observed within the 25 years prior to delineation and contained in the DFW's Natural Heritage and Endangered Species Program (NHESP) database, using species-specific habitat mapping guidelines. Priority habitat encompasses all currently and recently occupied piping plover habitat and includes all suitable nesting habitat (see Section 2.3.2) associated with piping plover breeding observations, as well as associated feeding and sheltering habitat.

Figure 2-1. Overall Plan Area

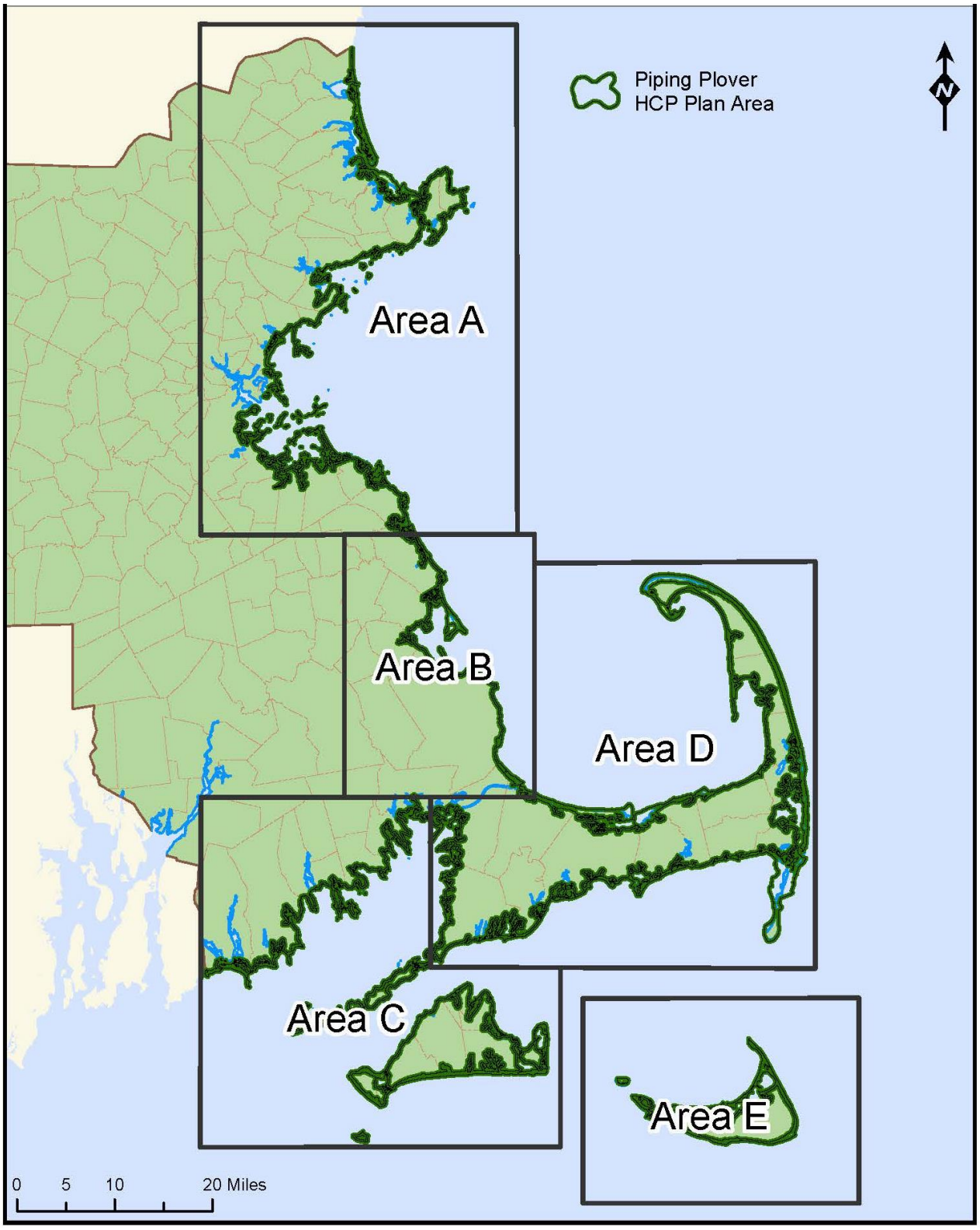


Figure 2-2. Plan Area - Detail Map Area A

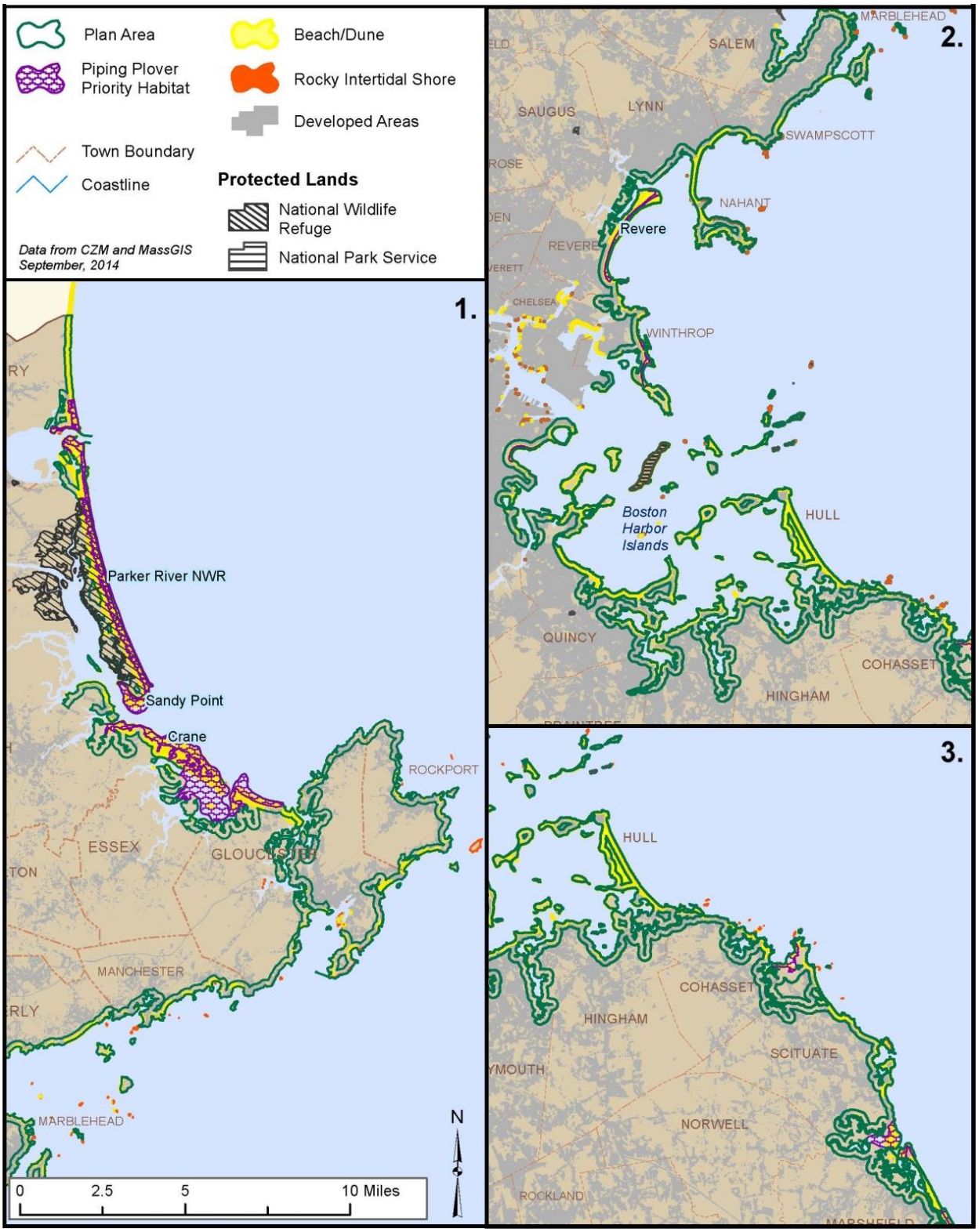


Figure 2-3. Plan Area - Detail Map Area B

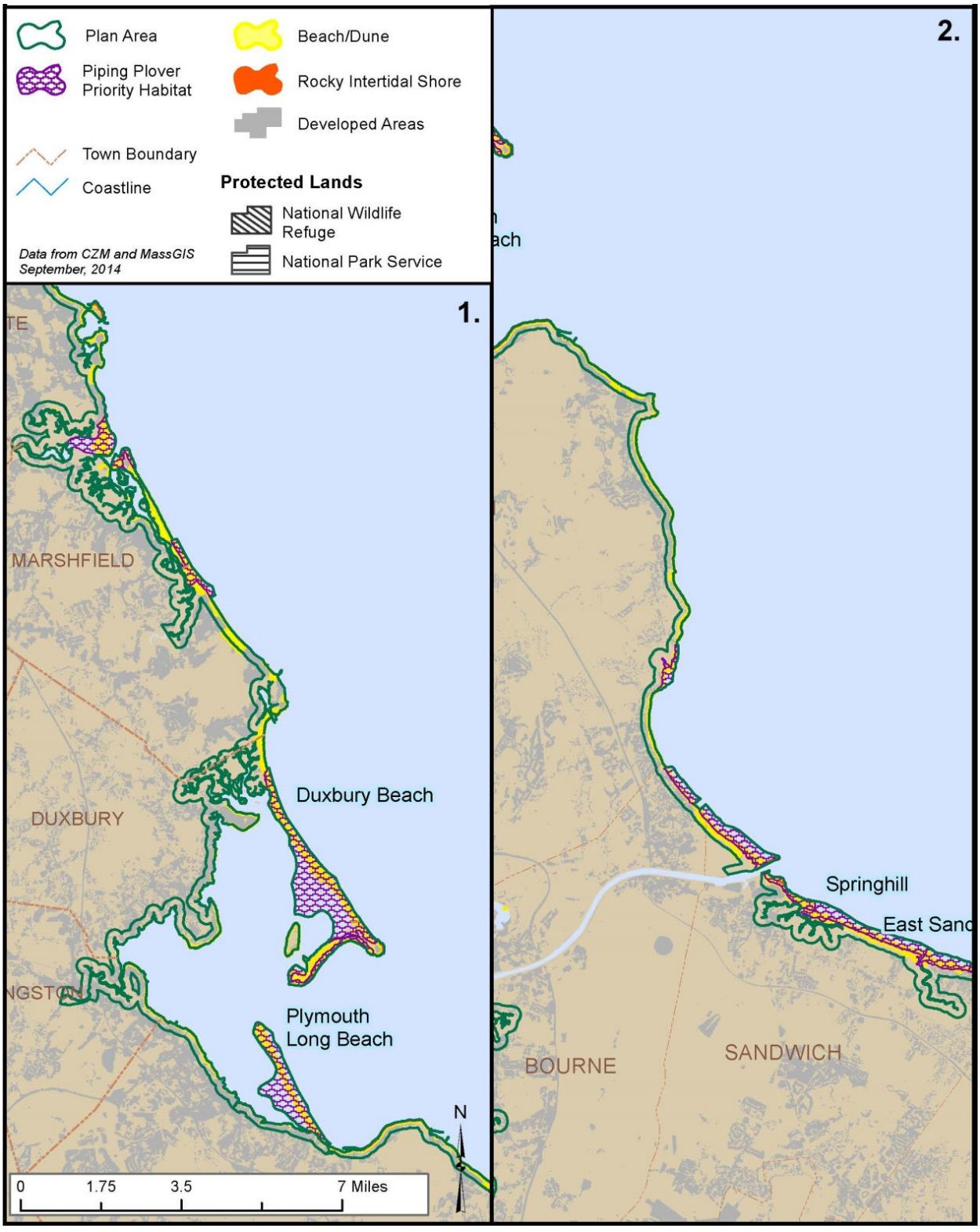


Figure 2-4. Plan Area - Detail Map Area C

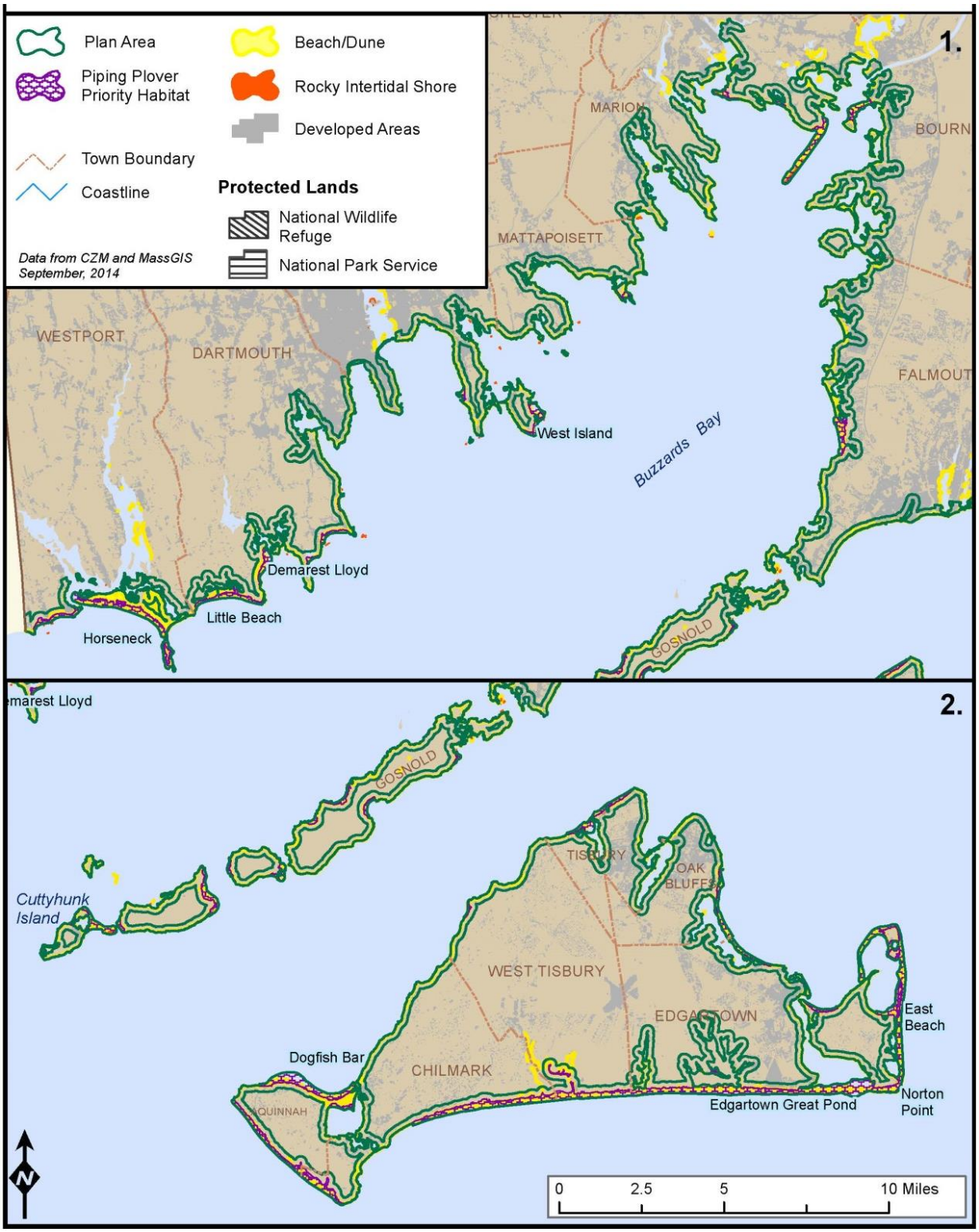


Figure 2-5. Plan Area - Detail Map Area D (East)

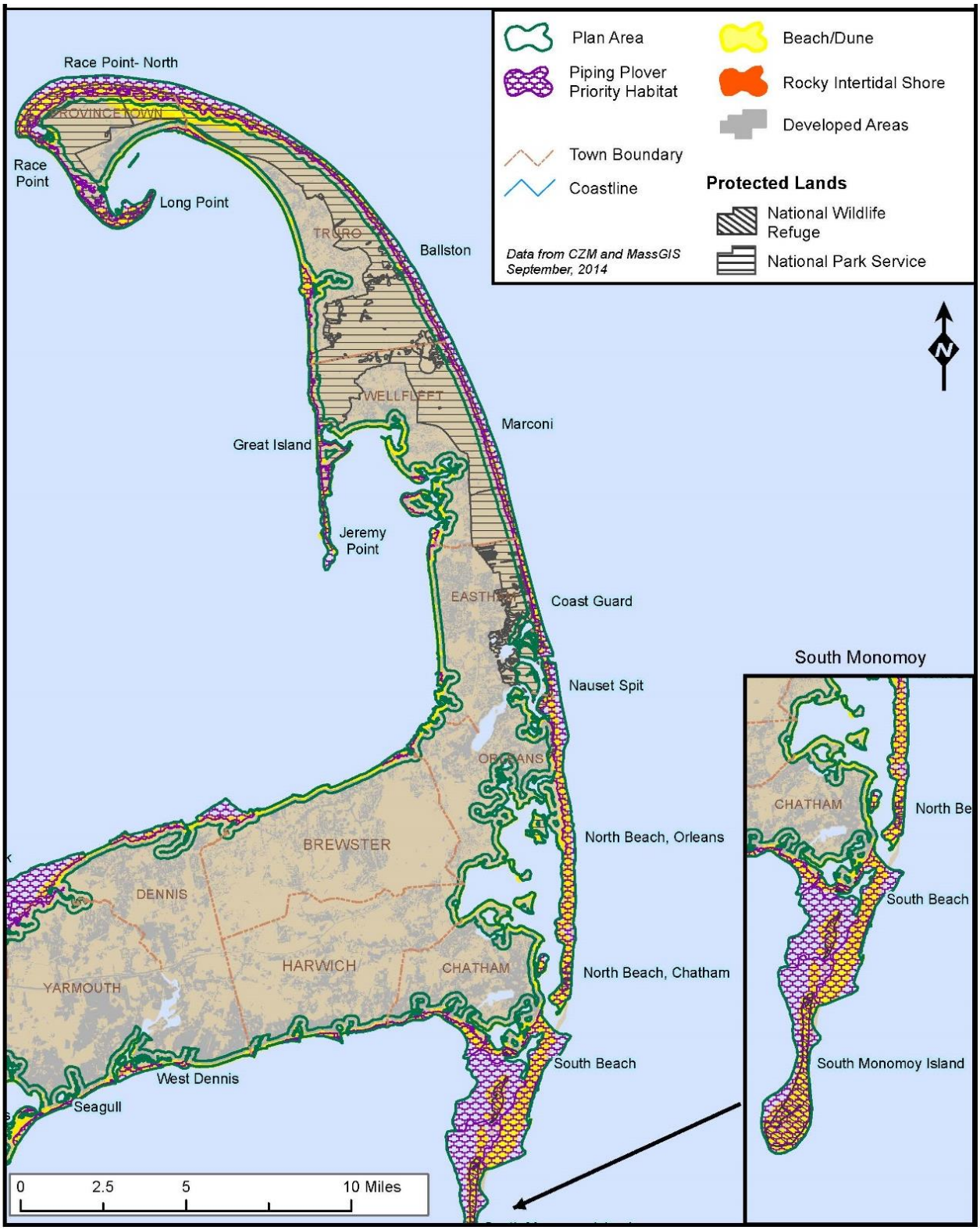


Figure 2-6. Plan Area - Detail Map Area D (West)

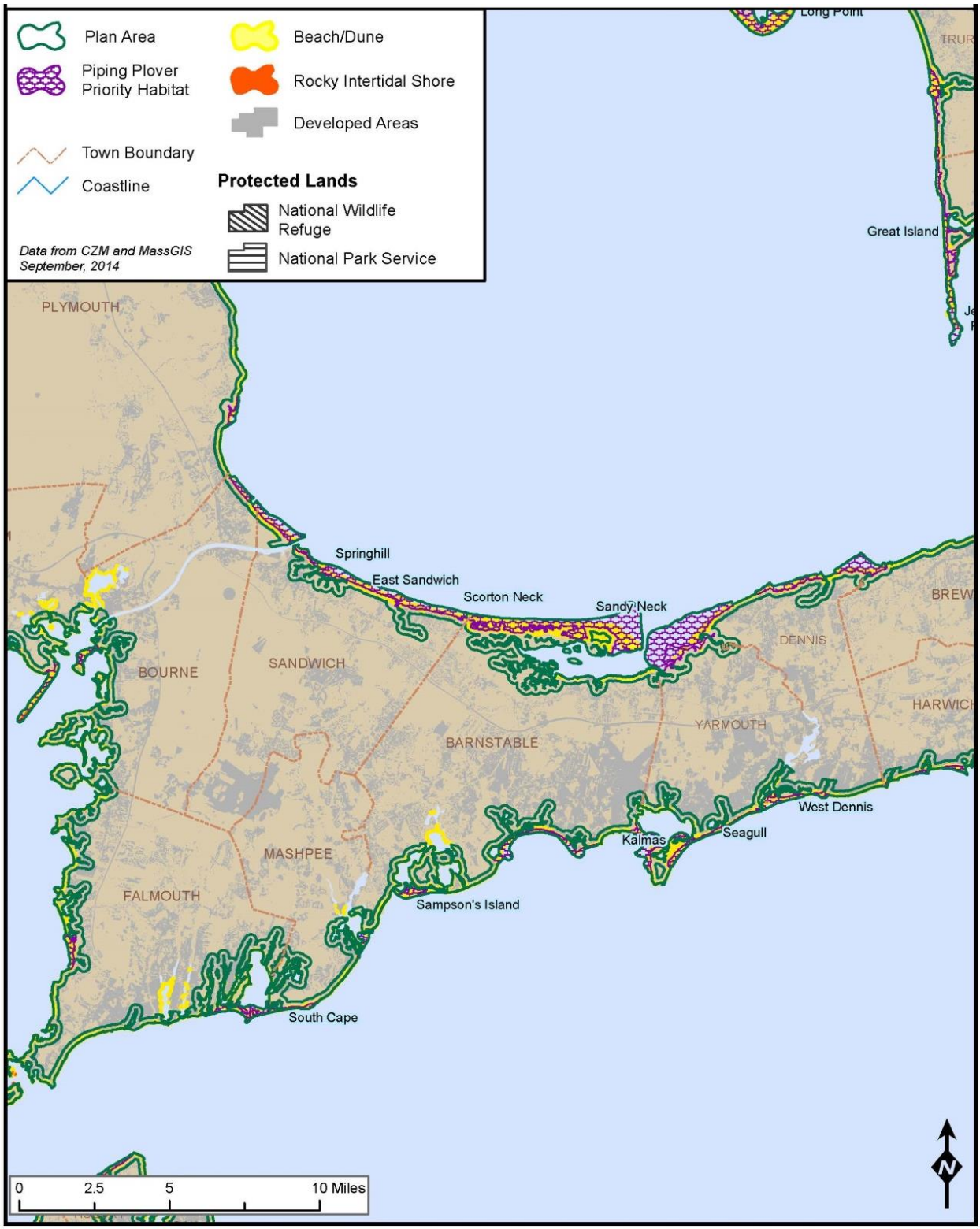
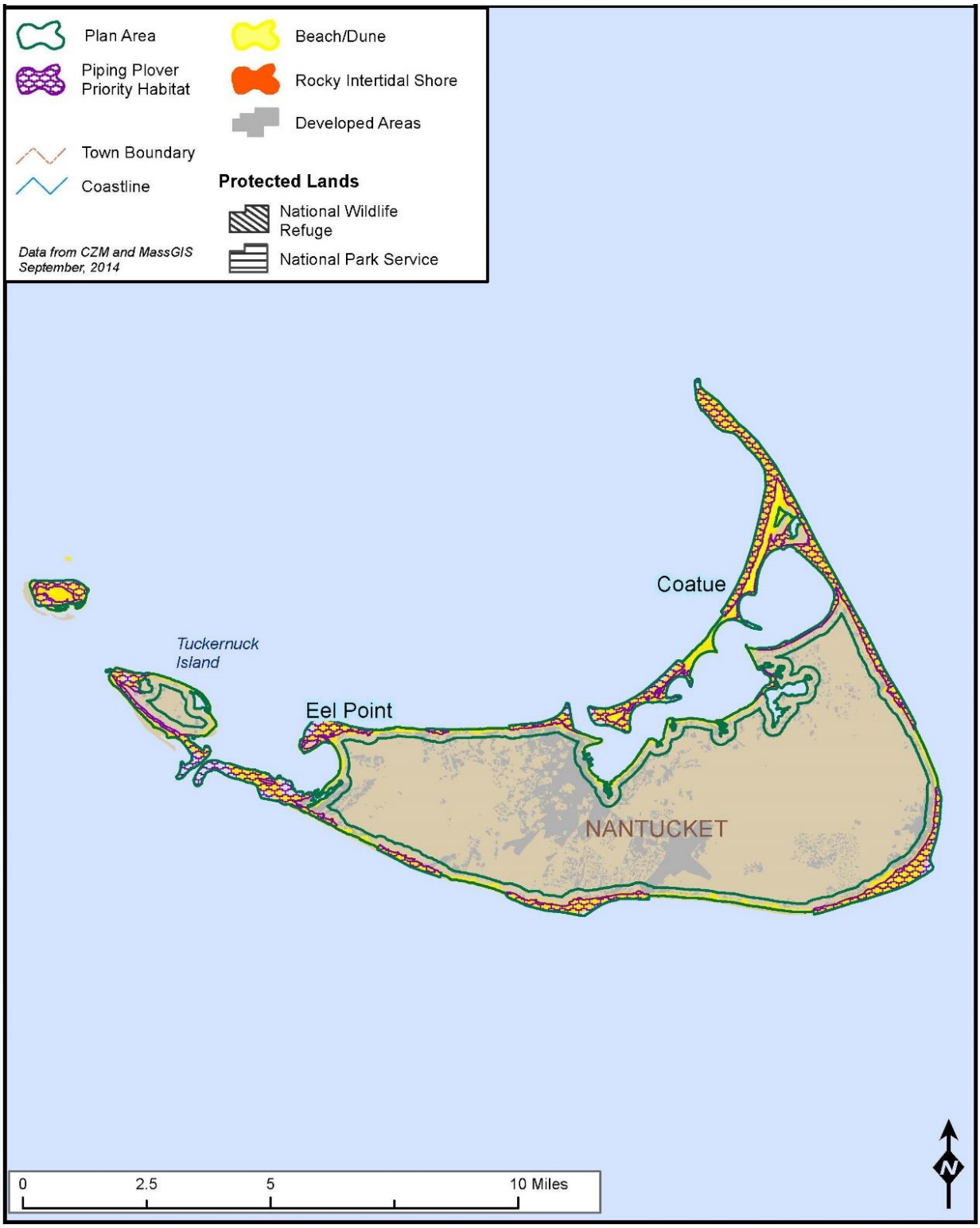


Figure 2-7. Plan Area - Detail Map Area E



In cases where priority habitat extends into nearshore waters, the entirety of the priority habitat is retained as part of the plan area to account for inaccuracies in coastline delineation.

The coastline was derived from the MassGIS Community Boundaries (Towns) From Survey Points datalayer, last updated in 2014 (Commonwealth of Massachusetts 2014). To delineate the coastal boundary, MassGIS collaborated with the Massachusetts Water Resources Authority and the Department of Environmental Protection to complete a 1:12,000 scale coastline. Because some areas of beach experienced significant erosion or accretion since the datalayer was constructed, a few areas of major change were digitized by the DFW based on recent aerial photograph interpretation to increase the accuracy of the beach, dune, and coastline delineations.

The priority habitats and the coastline were both buffered inland by 300 yards to include both beach areas not currently occupied by piping plovers but containing potentially suitable habitat, as well as areas where habitat could develop in the foreseeable future due to storm action, beach nourishment, and other processes. Finally, the plan area boundary was adjusted to exclude coastline that extends into portions of estuarine areas that do not provide suitable piping plover breeding habitat. Portions of estuarine areas and embayments nearest the ocean were retained because piping plovers may occupy sandy beaches within these areas.

The delineation of the coastline as depicted in the Plan is necessarily approximate; however, the intent is that the plan area will include the entirety of the terrestrial habitat available at a given site as determined in the field. Because the plan area is defined such that it always includes a 300-yard zone measured from the coastline as the coastline shifts over time, any new areas of beach forming in response to coastal accretion or erosion will be considered part of the plan area and thus covered by the Plan. To facilitate public understanding of the plan area, the DFW will update plan area maps and will provide these maps to the FWS a minimum of once every five years (and more frequently, if practical, in response to major coastline changes).

2.2.2 Surficial Geology

Like the rest of Massachusetts, the surficial geology of the coast is strongly influenced by the effects of recent glaciations, with the most recent glaciation occurring 15,000–20,000 years ago. The northern coastline from the New Hampshire border to northern Plymouth County is dominated by glacial till with occasional bedrock outcrops. Although rockier substrate and steeper slopes generally render this area less suitable for piping plovers, there are a few substantial beaches interspersed with smaller, sandy areas of suitable habitat. Plum Island in Newburyport, Crane Beach in Ipswich, and Revere Beach, in Revere, provide habitat for larger concentrations of piping plovers. The southern coast from central Plymouth County south through Cape Cod (Barnstable County) is dominated by sandy outwash material with some areas of morainal till (northern Martha's Vineyard and Buzzards Bay). The deep sands and gentle slopes of this area provide extensive piping plover breeding habitat, most notably on the Lower and Upper Cape, which account for about 60% of the breeding pairs of piping plover in Massachusetts.

Coastal beaches are subject to rapid change due to natural processes such as tidal action, currents, seawater overwashing the beach as a result of storms, and winds. Lateral sand migration results in the erosion of beaches and dunes in some areas and accretion and elongation of barrier beaches in others. Coastal storms may overwash or breach beaches, destroying vegetated dunes and ultimately leading to inland migration of beach habitat. Winter storms and summer and fall hurricanes also play a crucial role in creating and maintaining high-quality, sparsely vegetated piping plover nesting

habitat. In the absence of major storms, vegetated dunes may redevelop and expand, temporarily reducing available habitat. Conversely, repeated storms and other processes, such as lateral sand migration, may lower the beach profile of narrower beaches such that breeding season overwash increases in frequency, eliminating suitable habitat and increasing the likelihood of overwashing low lying nests.

Piping plover habitats shift in space and over time not only in response to these natural disturbance processes, but also in response to human activities that preclude natural disturbances that enhance or create plover habitat. Shoreline and dune stabilization, breakwater and jetty construction, seawalls, and artificial dune-building slow or prevent storm events from creating or enhancing piping plover breeding habitat. These human activities can accelerate the rates of change and habitat loss that result from natural processes. However, some types of carefully designed and implemented beach nourishment projects can improve the quality of habitat for piping plover by increasing beach width and maintaining suitable nesting and foraging habitat (See Section 2.3.2).

2.2.3 Climate and Climate Change

Climate and weather play major roles in shaping piping plover habitat. The effects of winter "northeasters" and hurricanes can be particularly dramatic, and the effects on specific beaches can vary dramatically over a small geographic area depending on factors such as beach orientation, exposure to wave action (i.e., bay versus ocean beaches), storm track, and timing relative to tides. Climate-related disturbance plays a critical role in both creating and eliminating suitable habitat, resulting in a shifting mosaic of habitats over time. Global climate change is also recognized as a potential major threat to wildlife populations and habitats, including for the piping plover.

Global climate change is occurring as a result of high concentrations of greenhouse gases in the Earth's atmosphere (National Research Council 2010; Intergovernmental Panel on Climate Change 2007). *Climate* is defined as the average weather over many years, while *climate change* refers to a statistically significant change in the state of the climate or its variability that persists for an extended period, typically decades or longer (Intergovernmental Panel on Climate Change 2013). Recent assessments demonstrate the Earth is undergoing changes in climate beyond natural variation (National Research Council 2010; Intergovernmental Panel on Climate Change 2013; Melillo et al. 2014). Evidence of long-term changes in climate over the twentieth century includes the following.

- An increase of 0.85 degree Celsius (°C) (1.53 degree Fahrenheit [°F]) in the Earth's global average surface temperature.
- An increase of 0.17 meter (6.7 inches) in the global average sea level.
- A decrease in arctic sea-ice cover at a rate of approximately 4.1% per decade since 1979, with faster decreases of 7.4% per decade in summer.
- Decreases in the extent and volume of mountain glaciers and snow cover.
- A shift to higher altitudes and latitudes of cold-dependent habitats.
- Longer growing seasons.
- More frequent weather extremes, such as droughts, floods, severe storms, and heat waves.

Sea level rise refers to the increase in mean sea level over time. Sea level has been rising around the globe for thousands of years since the end of the last ice age. During the last century, tide gauges and

satellites recorded measurements that indicate an acceleration of sea level rise relative to the past rate. Relative sea level rise addresses both the thermal expansion of seawater as it warms and the addition of water volume from melting land-based glacial ice sheets. Sea level rise also corresponds to localized changes in land surface elevations as a result of subsidence or sinking.

Tide gauge stations measure the height of water referenced to a horizontal control point, or benchmark, and gauges are used to track and predict tide levels and longer term changes in sea level. Long-term data sets from tide stations have been used to understand local and global sea level trends. The National Oceanic and Atmospheric Administration's (NOAA) Center for Operational Oceanographic Products and Services maintains several tide gauge stations across coastal Massachusetts, including long-term stations at Boston, Woods Hole, and Nantucket. Mean sea level trends from these long-term stations are listed in Table 2-1.

Table 2-1. Mean Sea Level Trends for NOAA's Massachusetts Tide Gauge Stations

Station	Mean Sea Level Trend and 95% Confidence Interval		Period	Century Rate (feet/100 years)
	millimeter/year	inch/year		
Boston, MA	2.79 ± 0.17	0.11 ± 0.007	1921–2012	0.92
Woods Hole, MA	2.81 ± 0.19	0.11 ± 0.007	1932–2012	0.92
Nantucket, MA	3.52 ± 0.42	0.14 ± 0.017	1965–2012	1.15

Sea level rise is one consequence of climate change, posing a threat to coastal ecosystems that may become inundated, resulting in habitat change or loss, and resulting in adverse impacts to species that depend on these habitats. Additionally, climate change may affect the frequency, severity, and timing of coastal storms. It is generally considered by climate scientists that coastal ecological resources are likely to be among the most sensitive to the changing climate, and climate change impacts on ecosystems over the next few decades could be most marked in coastal zones. The threat of climate change to piping plover and its habitat are discussed in further detail in Section 2.3.2, *Piping Plover*.

2.3 Biological Resources

Piping plovers are coastal inhabitants in Massachusetts, breeding, feeding, and sheltering in beachfront and dunes and feeding in these areas as well as the intertidal zone. As described above, the plan area includes these habitats and adjacent areas that could become suitable habitat in the future. This section describes land cover in the plan area, provides descriptions of the natural communities occupied by piping plovers, and discusses piping plover ecology, its distribution in Massachusetts, and the management measures already in place to protect the piping plover and its habitat.

2.3.1 Land Cover

A summary of land cover in the plan area is provided in Table 2-2. Although the Plan's covered activities and conservation actions are expected to occur nearly exclusively on beaches, with the potential to extend into intertidal areas, the plan area includes a 300-yard inland buffer adjacent to suitable piping plover habitat (e.g., the delineated piping plover priority habitat) to allow for potential changes in habitat and piping plover distributions over time. Land cover information was

derived from the Massachusetts Department of Environmental Protection (DEP) Wetlands Datalayer and Landuse (2005), both available through MassGIS (Commonwealth of Massachusetts 2009b, Commonwealth of Massachusetts 2009a). As described in Section 2.2.1 above, the beach and dune land cover type was modified to account for significant changes in beach area since the time the DEP layer was developed.

Table 2-2. Land Cover in the Plan Area

Land Cover Type	Area (acres)
Land	**127,932**
Beach & Dune	27,279
Coastal Bank, Bluff, Sea Cliff	1,772
Salt Marsh	23,393
Other Wetland	1,775
Forested Upland	23,972
Brushland, Pasture, Open Land	10,000
Developed Land	33,319
Other Land Uses	6,422
Ocean Water	**25,449**
Open Ocean	18,836
Tidal Flat	5,540
Rocky Intertidal Shore	1,073
Other Open Water	**3,017**

Sources: Commonwealth of Massachusetts 2009a; Commonwealth of Massachusetts 2009b

As of 2014, the DFW's NHESP has delineated 43,531 acres of priority habitat for piping plover (including approximately 19,610 acres of open water), based on recent, well-documented piping plover breeding observations incorporated into the NHESP database (321 CMR 10.02). Estimates of open water include intertidal feeding areas and are approximate due to the challenges of mapping the shifting shoreline.

2.3.2 Piping Plover

This section provides a summary of the piping plover's range, status, habitat, life history, population trends, Massachusetts distribution, threats, and the conservation actions currently in place in Massachusetts to protect this species and its habitats and to prevent take. Additional information on piping plover ecology can be found in the *Piping Plover Atlantic Coast Population Revised Recovery Plan* (FWS 1996a) and the *Piping Plover 5-Year Review: Summary and Evaluation* (FWS 2009).

2.3.2.1 Status

Piping plovers are federally-listed across their global range, with the FWS recognizing three separate breeding populations: Atlantic Coast (threatened), Great Lakes (endangered), and Northern Great Plains (threatened). Critical habitat was designated for the Great Lakes population in 2001 and for the Northern Great Plains population in 2002 (FWS 2009). No critical habitat has been proposed or designated for the breeding range of the Atlantic Coast population. All piping plovers are classified as threatened on their shared migration and wintering range. Section 1 of the *Piping*

Plover 5-Year Review: Summary and Evaluation contains a detailed discussion of the history of recovery planning and rule-making for the listed populations (FWS 2009). Genetic analysis and banding studies support the conclusion that the Atlantic Coast birds are genetically isolated from inland populations and thus should be considered as two subspecies, Atlantic Coast and interior (which includes both the Great Lakes and Northern Great Plains populations) (summarized by FWS 2009).

2.3.2.2 Range

Piping plovers are small, sand-colored shorebirds that nest along the Atlantic Coast on sandy beaches from North Carolina to Newfoundland. In winter they migrate farther south, from North Carolina to Florida, the Gulf of Mexico, and the Caribbean. The Atlantic Coast population ranges from maritime Canada (Newfoundland) to North Carolina, with four recovery units: (1) Atlantic Canada, (2) New England, (3) New York–New Jersey, and (4) Southern (Delaware, Maryland, Virginia, and North Carolina) (FWS 1996a).

Other populations of piping plovers nest along rivers and the shorelines of alkali lakes on the Northern Great Plains and along the shores of the Great Lakes, migrating to the Gulf of Mexico in the winter. Recent field surveys suggest that the Bahamas may provide particularly important wintering habitat for the Atlantic Coast population (FWS 2012b).

2.3.2.3 Habitat

Atlantic coast piping plover nesting habitat includes sandy beaches above the high-tide line, sand flats at the end of sand spits, gently sloping foredunes, and unvegetated "blow-outs" and washover areas created by wind and wave action between or behind coastal dunes. Piping plovers may also nest where suitable sandy, dredged material has been deposited. Nests are simple scrapes (shallow depressions) in the sand or in mixtures of sand, gravel, cobble, and shells. Nests are placed on open sand or in patches of sparse to moderately dense beach grass and other dune vegetation. Piping plovers depend on natural processes of beach erosion and accretion through wind and wave action to maintain this suitable nesting habitat.

Primary feeding habitats for both adults and chicks are the intertidal zones of both ocean-facing and bay-side beaches (especially wet sand areas) and wrack (seaweed, vegetation, shells, and other organic debris deposited on the beach by tides and storms).

Table 2-3 lists natural communities that piping plovers are associated with in Massachusetts (based on Swain and Kearsley 2011).

Table 2-3. Natural Communities Associated with the Piping Plover in Massachusetts

Natural Community	Habitat Function
Maritime Beach Strand Community	Nesting/Some Foraging
Maritime Dune Community	Nesting/Some Foraging
Estuarine Intertidal: Saline/Brackish Flats	Primary Foraging
Marine Intertidal: Flats	Primary Foraging
Marine Intertidal: Gravel/Sand Beach	Primary Foraging
Source: NHESP; DFW 2011	

2.3.2.4 Life History

When piping plovers migrate from wintering areas to nesting beaches, males establish and defend territories and court females. Males use their bodies to make multiple scrapes in the sand within their territories. Females inspect these scrapes and eventually select one into which they lay their eggs. Prior to egg-laying, the birds may place small shell fragments or pebbles in the bottom of the scrape that is selected for nesting; the exact function of this behavior is uncertain. In Massachusetts, piping plovers return to nesting beaches from mid-March through May, and incubation may occur from mid-April through late July.

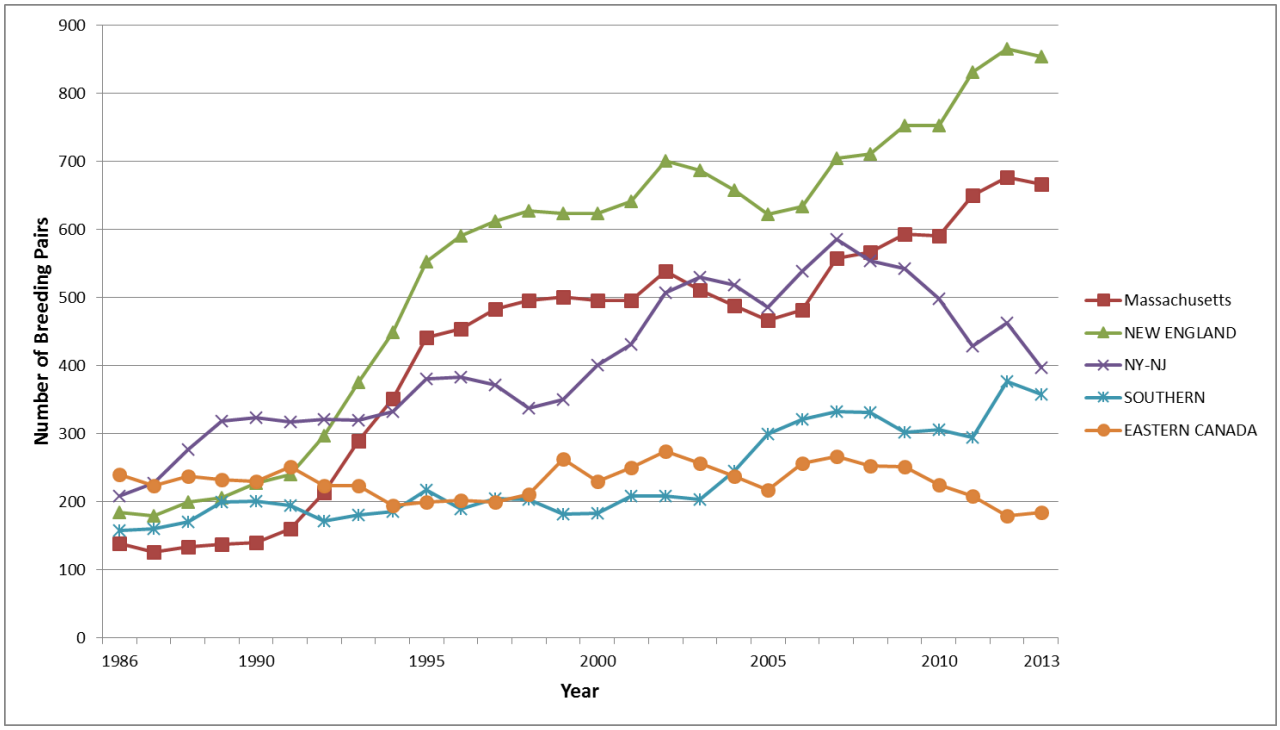
Clutch size is usually four eggs, with one egg laid every other day over a week's time; eggs are usually incubated for 27–28 days by both sexes before hatching. Successfully nesting piping plovers usually fledge no more than a single brood per season, but may renest several times if previous clutches are lost. Renesting is unlikely in pairs that successfully hatch eggs, although renesting may occur if chicks are lost within a few days of hatching.

Piping plovers are precocial, meaning that they are able to move about and search for food within hours after hatching. They may move hundreds to thousands of yards from the nest site during their first week of life. Typically, chicks remain together with one or both parents until they fledge (are able to fly) at 25–35 days of age, although juveniles remaining with their parents after fledging have been documented at a number of sites. Once chicks attain flight, they are presumably better able to escape potential predators and seek out alternative habitats if disturbed by human activities. Depending on the date of hatching, unfledged chicks may be present on Massachusetts beaches from late May through late-August, although most fledge by late July or early August.

Piping plovers feed on small invertebrates such as amphipods, flies, beetles, and marine worms. The most important feeding habitats for both adults and chicks are the intertidal zones of both ocean-facing and bay-side beaches (especially wet sand areas) and wrack. Chicks must obtain adequate food to sustain rapid rates of growth and development, maintain body temperature, and escape predators. Nesting and feeding territories may be vigorously defended from intrusion by other adult piping plovers.

2.3.2.5 Population Trends

In 1986, at the time of federal and state listing, the Atlantic Coast piping plover population was estimated at 790 pairs, with a Massachusetts population of 139 pairs. Since that time, the Atlantic Coast population has grown significantly (128%), including a 382% increase within Massachusetts and a 366% increase in the New England Recovery Unit overall. Growth in New England significantly outpaced growth in other recovery units (-23% to 127%) and the Atlantic Coast Population as a whole (128%) through 2013 (



) (FWS Unpublished Data). For this reason, the Massachusetts population represented approximately 17.6% of the Atlantic Coast population in 1986 as compared to approximately 37.3% in 2013.

New England is the only recovery unit to have consistently exceeded the regional recovery goal for minimum population size established in the Revised Recovery Plan (FWS 1996a).[10] The recovery goal of 625 breeding pairs was first exceeded in 1998 and has been exceeded in all but three years during the period 1998–2013(1999, 2000, 2005). The Massachusetts population alone exceeded the minimum population size recovery goal for the New England unit as a whole during the period 2011–2013 (

[10] The NY-NJ unit exceeded its goal for one year (2007).

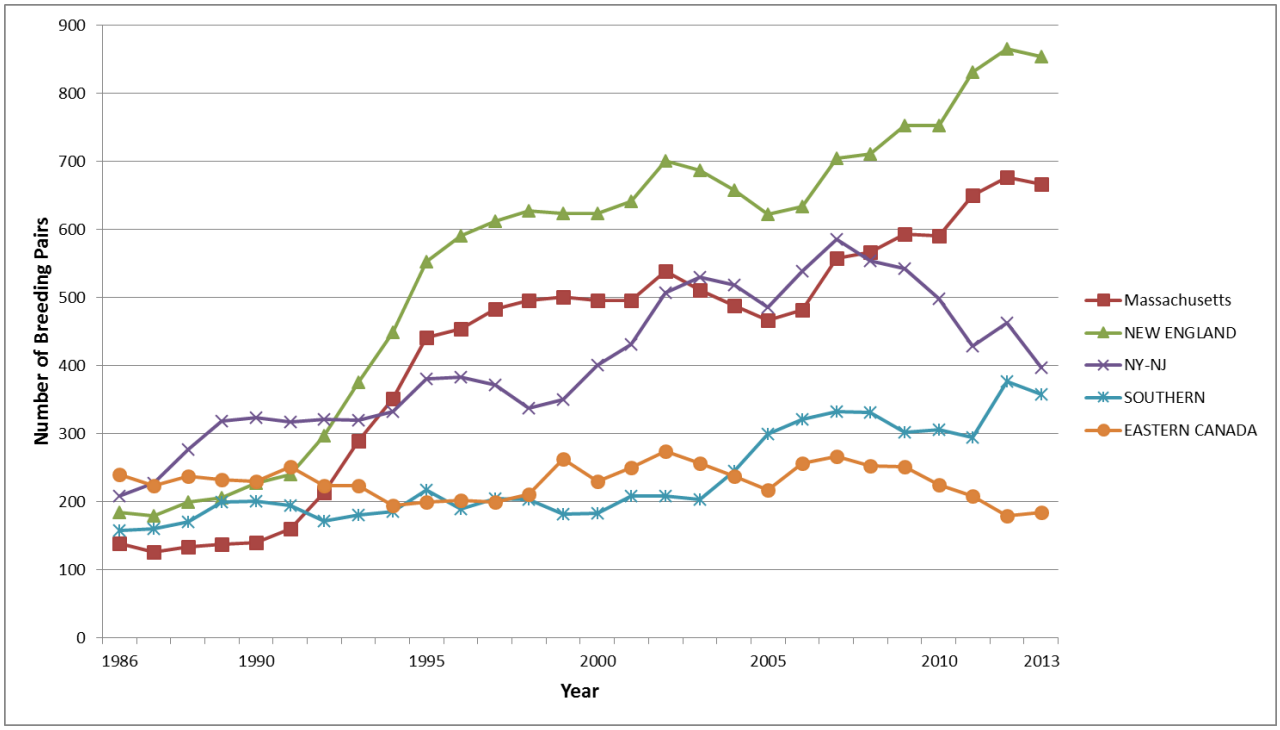


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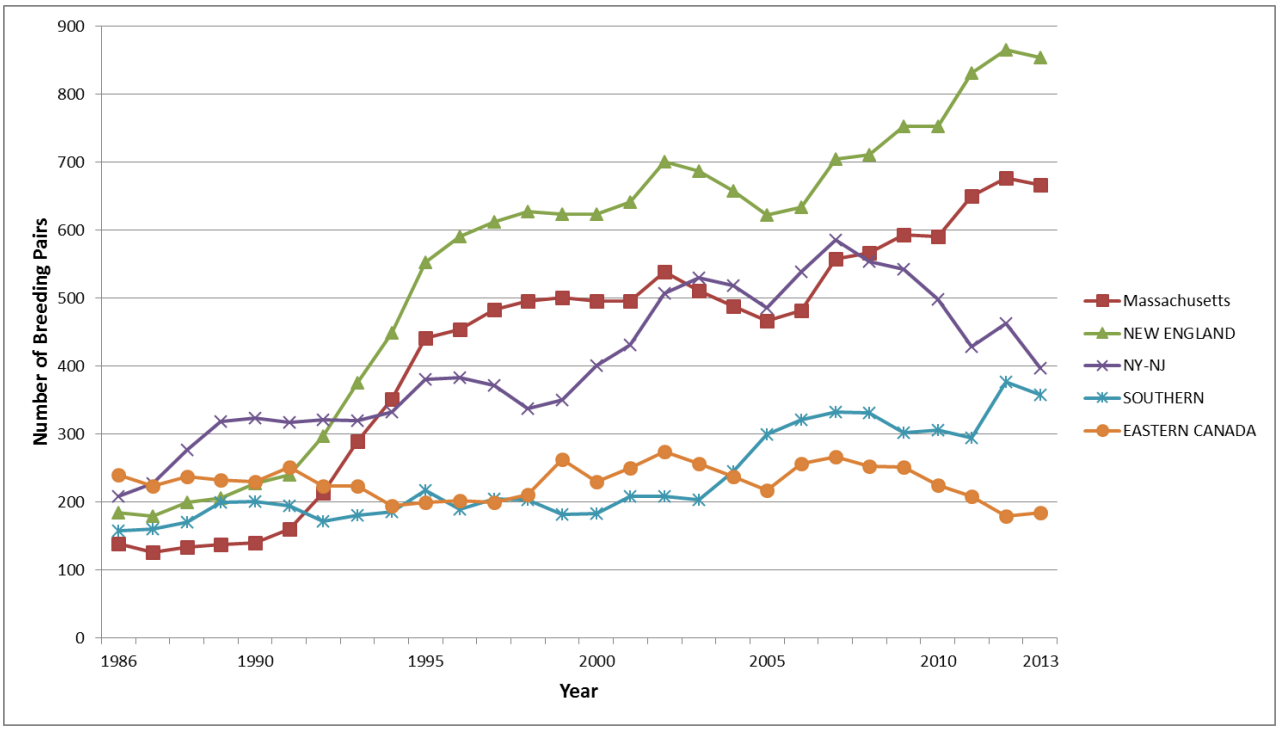
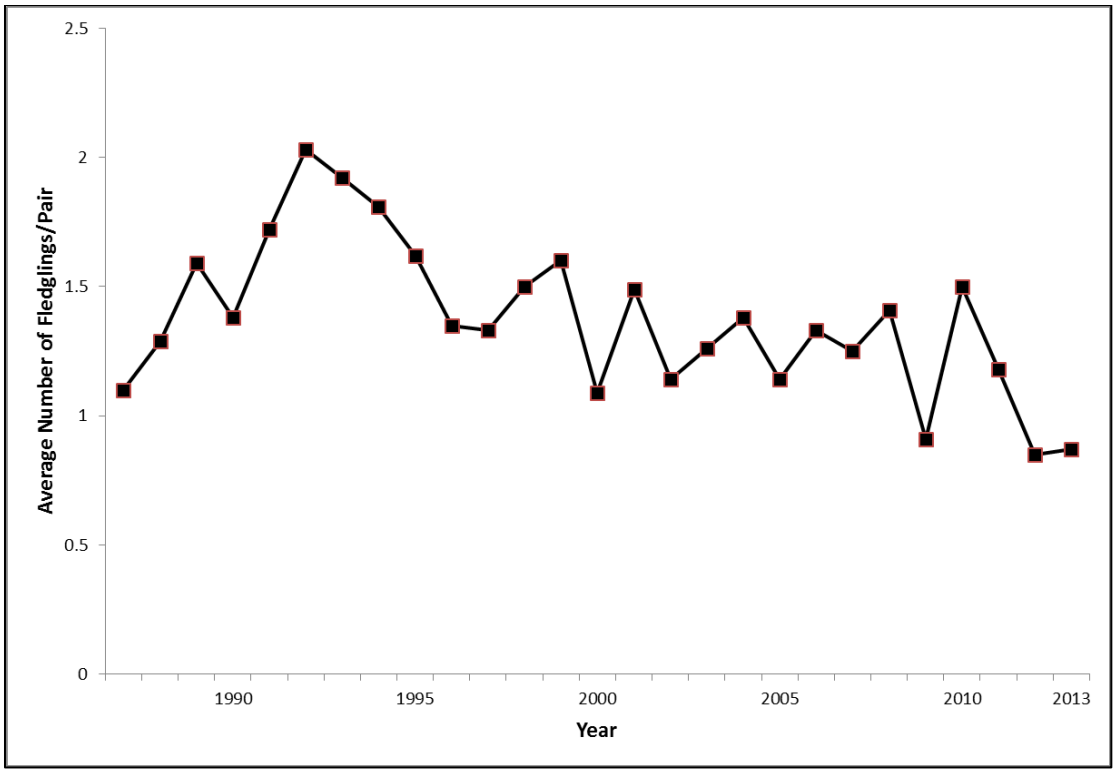
Figure 2-8. Number of Breeding Pairs of Piping Plover in the Atlantic Coast Recovery Units and Massachusetts, 1986 – 2013. (The Southern Unit Includes DE, MD, VA, and NC.)



From 1987–2013, the average productivity of the Massachusetts population was 1.4 fledglings per breeding pair, above the approximately 1.2 fledglings per pair thought to be required to maintain a stable population in New England (Melvin & Gibbs 1996; Hecht & Melvin 2009) (Figure 2-9). Although there is no clear trend in productivity during this time period, productivity in four of the past five years was well below the long-term average (2009–2013, average = 1.0), suggesting there could be an emerging downward trend. Similarly, in contrast to population size, there were no clear productivity trends in the other recovery units or in the Atlantic Coast population as a whole during this time period (see FWS Abundance & Productivity Estimates-2010 Update[FWS 2011]; see also U.S. Fish and Wildlife Service Abundance & Productivity Estimates-2011 Update [FWS 2012a] and Preliminary 2012 Update [FWS 2013]).

Figure 2-9. Average Productivity (Number of Fledglings/Pair), Massachusetts, 1987 – 2013

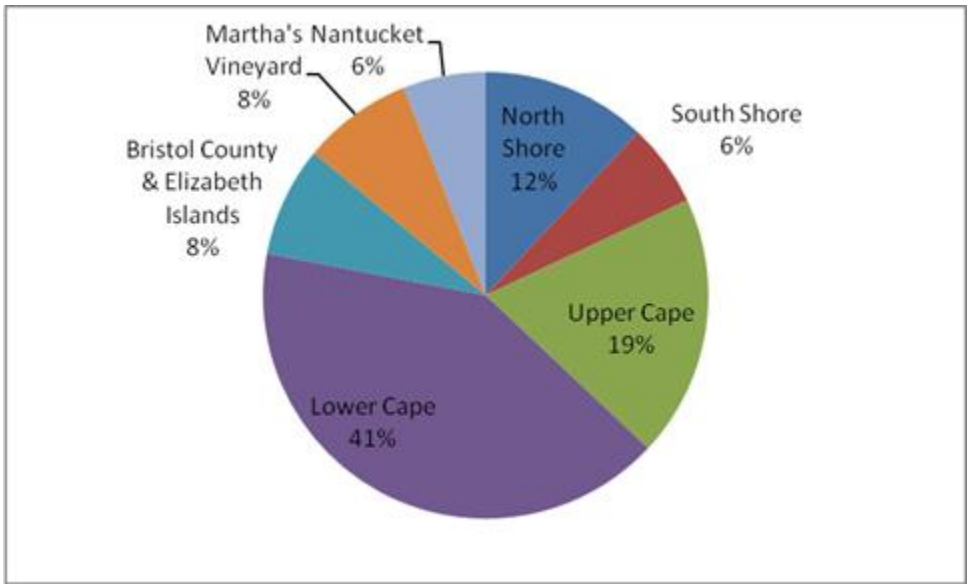


Source: DFW Unpublished Data.

2.3.2.6 Massachusetts Distribution

Two regions harbored 60% of the total breeding pairs in the state in 2013: the Lower Cape (41%) and the Upper Cape (19%) (Figure 2-10). Individual sites with the largest numbers of pairs are listed in Table 2-4. Although the 17 largest sites (i.e., those with ≥ 10 pairs) supported 53% of all pairs in the state, the smallest sites (1–3 pairs, n = 91 sites) were collectively also important, accounting for over 23% of all pairs.

Figure 2-10. Distribution of Piping Plover Breeding Pairs by Region, Massachusetts, 2013



Source: DFW Unpublished Data.

Table 2-4. Sites with ≥10 Piping Plover Breeding Pairs, Massachusetts, 2013

Site Name	Town	No. Breeding Pairs
South Beach (south end)	Chatham	53
South Monomoy Island	Chatham	50
Parker River NWR	Newbury/Rowley	32
Crane Beach	Ipswich	28
Sandy Neck	Barnstable	27
North Beach Island	Chatham	22
Duxbury Beach	Duxbury/Plymouth	17
Sampson's Island/Dead Neck	Barnstable	16
Plymouth Long Beach	Plymouth	15.5
Norton Point/Leland/Cape Pogue Elbow	Chappaquiddick/Edgartown	15
North (Nauset) Beach	Orleans	14
Nauset Spit (Heights)	Orleans	14
Race Point South	Provincetown/Truro	14
Little Beach/Barney's Joy	Dartmouth	14
North (Nauset) Beach	Chatham	13
South Beach (north end)	Chatham	11
Marconi Beach	Wellfleet	10

Sources: DFW Unpublished Data.

Figure 2-11. Massachusetts Regions for the Piping Plover Census

2.3.2.7 Threats

Threats to piping plovers along the Atlantic Coast in general and in Massachusetts in particular include disturbance by humans, pets, and vehicles (usually associated with recreational activity), predation, and habitat modification and loss. Additional threats to plovers include beach raking, oil spills, wind turbines, climate change, and storm surge.

Human Disturbance

Piping plovers are vulnerable to disturbance from human activity, pets, and vehicles while feeding and resting and during courtship, egg-laying, incubation, and brood-rearing. Prolonged or repeated disturbance can lead to egg or chick mortality from exposure, abandonment, or predation. Prolonged disturbance may also result in abandonment of otherwise suitable nesting habitat before eggs are laid. Driving, pets, and pedestrians can also lead to destruction of nests and direct loss of chicks, fledglings, and adults.

Human disturbance, generally associated with recreational beach use, can pose a moderate to severe threat at sites with inadequate management. Indeed, human recreation was cited as a major threat to Atlantic Coast piping plover breeding sites in both the 1986 listing decision and the 1996 revised recovery plan and the 2009 *Piping Plover (Charadrius melodus) 5-Year Review: Summary and Evaluation* notes that, "Disturbance by humans and dogs is a continuing widespread and severe threat to Atlantic Coast piping plovers." (FWS 1996a, FWS 2009) However, in Massachusetts, recreational disturbance currently poses a generally low threat to the piping plover population due to effective and widespread management of these uses in accordance with the Guidelines. Over 25 years of data from beaches with high rates of recreational use demonstrate that a large piping plover population with high productivity can be sustained in the face of significant recreational beach use, as long as beach use is carefully managed to avoid and minimize impacts to the species.

Predation

The loss of nests, chicks, fledglings, and some adults to predation is a large and increasing threat in Massachusetts and elsewhere along the Atlantic Coast (FWS 2009). The particularly low productivity of piping plovers in Massachusetts from 2009–2013 is attributable largely to high predation rates and is a major cause for concern, although major storms were also an important factor. A review of plover census forms submitted to the DFW by cooperators indicates that predation or suspected predation is the dominant cause of nest failure in the state. Although predation rates shift over time, some examples of beaches with extremely high predation rates and little or no productivity in recent years include Nauset, Kalmus, and Norton Point beaches. While predation on chicks is rarely observed, predation is believed to account for the great majority of prefledging chick loss. Predator species and predation intensities vary widely by site and may include skunks, raccoons, foxes, crows, coyotes, feral cats and dogs, gulls, and rats. The reasons for this recent increase in predation are unknown. Some of this increase may be due to greater exposure to predators by a growing population of piping plovers. Furthermore, some predator populations may have increased in response to changes in land use (e.g., residential development) or recreational activity on and in the vicinity of nesting beaches (although predation rates may also be high at remote sites with low recreational activity).

Until recent years, wire cages with a mesh top, known as predator exclosures, were frequently placed around piping plover nests to protect them from predators (Deblinger et al. 1992). However,

concerns about adult mortality and nest abandonment associated with predator exclosures have resulted in their decreased use even in the face of continuing high predation pressure. As a result, predation continues to pose a significant threat to plovers, while options for managing this threat have become more limited. This has led to increased emphasis on selective predator management as an important recovery tool for plovers in recent years.

Habitat Modification and Loss

Habitat modification and loss from activities such as dune and bank stabilization, construction of breakwaters and jetties, and shoreline development poses a significant long-term threat to piping plovers. In addition to direct habitat loss associated with activities such as dune building in overwash nesting areas, sea wall construction or other attempts at shoreline stabilization can lead to increased rates of erosion and habitat loss in adjacent areas and can impede natural storm processes from maintaining suitable habitat over time. Although the *Piping Plover 5-Year Review* (FWS 2009) concludes that the overall threat from such projects is low in the New England Recovery Unit at this time, the projected effects of climate change, including sea level rise, suggest that threats from habitat modification and loss could be increasing.

Beach Raking

Beach raking can degrade plover habitat by eliminating vegetation, wrack, and other beach debris used for feeding and sheltering. It also has the potential to cause direct loss of nests and chicks. Beach raking is not a widespread beach management practice in Massachusetts at this time, although sections of beach are raked.

Oil Spills

Oil spills pose an occasional threat to piping plovers, and can result in direct mortality and habitat degradation. As evidenced by a 2003 spill in Buzzards Bay, restoration programs funded by responsible parties can help to mitigate impacts (FWS 2009).

Wind Turbines

Offshore or coastal onshore wind turbines pose a potential threat to piping plovers due to the potential for bird strikes, especially during migration. The Massachusetts Ocean Management Plan (Executive Office of Energy and Environmental Affairs 2009) places significant restrictions on the siting of wind turbines in Massachusetts nearshore waters, thereby significantly reducing this risk in and near the plan area. The extent of this threat, both offshore and coastal onshore, is unknown, indicating the need for additional monitoring. However, single industrial-size turbines may be erected on land with limited regulatory oversight and limited post-construction monitoring. Such installations could become a threat depending on numbers and locations.

Climate Change

Climate change poses a significant, potential long-term threat. Climate change-associated sea level rise may result in direct habitat loss if beaches are not able to migrate inland over time. The potential for increased summer storms or storms of increased severity could also pose a threat of increased nest loss due to storm overwash and possible habitat loss. However, coastal storms are essential to creating and preserving suitable nesting habitat over time and the short- and medium-

term potential effects of climate change are not known (see also Section 2.2.3, *Climate and Climate Change*).

While the precise effects of climate change on piping plover habitat are unknown, climate change and sea level rise have the potential to degrade habitat (e.g., by increasing the frequency of nest loss to storm overwash). On the other hand, relatively intact barrier beach-salt marsh systems may be resilient if the beach-strand system is able to migrate inland over time. Human efforts to respond to coastal erosion and protect property and infrastructure from flooding and storm damage (e.g., bank hardening) can lead to accelerated rates of erosion in nearby areas and result in permanent piping plover habitat loss over time. Although the long-term effects of climate change are likely to be unfavorable, the shorter-term effects are less clear. Depending on the timing and severity of storms and effects on spring temperature and rainfall patterns, shorter-term effects could be neutral, favorable, or negative.

Seavey et al. (2010) assessed the threat of sea level rise to the breeding habitat of piping plover on the barrier islands of Suffolk County, New York. They estimated the extent of habitat change over the next 100 years under several sea level rise assumptions, as well as the interactive effects of coastal development and storm surge. They found that if piping plover habitat cannot migrate, sea level rise is likely to reduce breeding areas. However, if habitat is able to migrate upslope and inland, breeding areas could actually increase with sea level rise. They also found that the spatial configuration of developed areas mattered more than the intensity of development in blocking the migration of potential habitat area.

These results raise concern over the likelihood of increased conflict between piping plover habitat protection and human recreation. Also, these results highlight risk from the combination of sea level rise and coastal storms: A large hurricane could flood up to 95% of piping plover habitat in some areas. Seavey et al. (2010) concluded that to assure the future of piping plover habitat on these barrier islands, management needs to promote natural overwash and habitat migration while minimizing development adjacent to future breeding habitat.

The North Atlantic Landscape Conservation Cooperative is conducting a project to predict how piping plover breeding habitat will change as a result of sea level rise and altered storm patterns. The project will also analyze the effectiveness of conservation strategies, given projected sea level rise. It will provide biologists and managers along the Atlantic Coast with tools to predict the effects of accelerating sea level rise on the distribution of piping plover breeding habitat, test those predictions, and feed the results back into the modeling framework to improve predictive capabilities. Immediate model results will be used to inform a coast wide sea level rise risk assessment and related habitat conservation recommendations that can be implemented by land managers, and inform recommendations to regulators.

Other Potential Threats

Emerging recreational activities should be evaluated to determine whether they have the potential to impact piping plovers and their habitats. These include fat tire beach bikes and kiteboarding—activities that post-date the Guidelines and therefore are not addressed in the Guidelines. The extent to which these activities may pose a threat to piping plovers and their habitats in Massachusetts is still being assessed. At this time, the use of fat tire bikes is limited. Kiteboarding is a growing sport; however, this activity requires very specific wind conditions that limit the number of suitable kiteboarding days during the piping plover breeding season. Kiteboarding has begun to be regulated in the state - the Monomoy National Wildlife Refuge prohibited kiteboarding in their draft

Comprehensive Conservation Plan and as of 2014 the National Park Service had prohibited it seasonally at the Cape Cod National Seashore. Some beach managers are working proactively with fat tire biking groups and kite surfers to direct use away from sensitive habitat areas at specific times of year. The DFW will work with the FWS to continue to assess these activities.

Other activities, such as beach nourishment, have the potential to negatively impact piping plover (but see Section 2.2.2 for a discussion of the potential benefits of beach nourishment, under certain circumstances). Beach stabilization can also lead to loss of dynamic processes that create habitat for piping plover, including storm-created features.

2.3.2.8 Conservation Actions

Beach managers, in cooperation with the DFW and the FWS, are currently implementing a variety of actions that substantially reduce the risk of take associated with recreational beach use activities to very low levels. These actions also increase productivity and nest success, and contribute substantially to regional and population-wide plover recovery. These activities will continue during Plan implementation and will form the foundation upon which the Plan is built.

Management in Accordance with State and Federal Guidelines

As described above, without adequate management, certain recreational beach activities can pose a significant threat to piping plovers. Pedestrians, pets, OSVs, and beach raking have the potential to significantly disrupt feeding, breeding, nesting, and sheltering behavior, and harm or kill eggs, chicks, fledglings, and adults. Inadequately managed OSV use and beach raking also have the potential to degrade habitat, for example by destroying beach wrack and vegetation. Beginning in the late 1980s and early 1990s, the DFW began working with beach managers and property owners throughout Massachusetts to implement management measures to protect the piping plover and its habitat and dramatically reduce the risk of take. These management measures are described in the State Guidelines (DFW 1993) (see Appendix A). Federal Guidelines (FWS 1994, FWS 2015) closely parallel the State Guidelines (Hecht, Personal Communication, dated May 15, 2015). Both State and Federal Guidelines provide guidance to beach operators seeking to ensure compliance with MESA and the ESA, as well as with the state-listed species provisions of the Massachusetts Wetlands Protection Act. Although adherence to the Guidelines is the primary management and conservation tool for piping plovers in Massachusetts, many beach managers have gone beyond the minimum management measures described in the Guidelines by, for example, deploying predator exclosures and implementing selective predator management.

Since 1993, steady progress has been made increasing the number of sites managed in accordance with the Guidelines and improving implementation. Currently, most public access recreational beaches in Massachusetts with breeding piping plovers are managed in accordance with the Guidelines. More broadly, the DFW estimates that over 95% of breeding piping plovers in the state are monitored, included in the statewide piping plover census, and managed in general accordance with the Guidelines. Although challenges remain, over 20 years of management experience has demonstrated that piping plovers can breed successfully and achieve high fledging success even at high-use recreational beaches if appropriate management measures are implemented. In recent years, high-use recreational beaches, such as Demarest Lloyd State Park, Dartmouth, Revere Beach, Revere, Seagull Beach, Yarmouth, and West Dennis Beach, Dennis, have been productive. In contrast, some beaches with excellent habitat and relatively little recreational use have experienced poor reproductive success due to high predation pressure.

Table 2-5 provides a summary of the piping plover protection measures already in place through implementation of the State Guidelines, with footnotes highlighting key differences between the State and Federal Guidelines. This summary is not intended to replace or fully represent information provided in the Guidelines, which should be consulted directly in making management decisions.

Table 2-5. Summary of Piping Plover Protection Measures in the 1993 State Guidelines

Protection of Nests and Nesting Habitat[1] – Symbolic Fencing	
Beaches with OSVs	All areas of suitable piping plover and tern nesting habitat, as determined by the DFW must be identified and delineated with posts and warning signs or symbolic fencing on or before April 1 (for piping plovers) or May 15 (for terns) each year. No entry into delineated areas. Prior to nest hatching, OSVs may pass delineated habitat areas along designated vehicle corridors as long as piping plovers are not being disturbed.
Other recreational beaches	All areas of suitable piping plover and tern nesting habitat must be identified and delineated as they are for beaches with OSVs, if in the opinion of the DFW, failure to do so could discourage plovers or terns from nesting as a result of disturbance from human use. At a minimum, a 50-yard radius area around nests and chicks above the high tide line must be delineated with posts and warning signs or symbolic fencing. Refuge areas should be expanded if the 50-yard radius is deemed inadequate to protect incubating adults or unfledged chicks from harm or disturbance. In practice, symbolic fencing is proactively deployed prior to the nesting season at the great majority of recreational beaches without OSVs. However, remote beaches or other low access sites with adequate monitoring may not need all suitable habitat to be proactively delineated as long as the 50-yard area around nests and chicks is delineated.
Protection of Chicks and Chick Habitat – Timing Restrictions on OSV Use	
Sections of beaches where unfledged piping plover or tern chicks are present must be temporarily closed to all vehicles not deemed essential.[2] When unfledged piping plover chicks are present, vehicles are prohibited from all dune, beach, and intertidal habitat within 100 yards of either side of a line drawn through the nest site and perpendicular to the long axis of the beach.[3] The resulting 200-yard wide area of protected habitat should extend from the ocean side low water line to the bay side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists.[4] However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally occurring obstacles.[5] If unfledged chicks move outside the original 200-yard wide area, then the boundaries of the protected area should be adjusted to provide at least a 100-yard buffer between chicks and OSVs.	
Other Protections	
Pets should at a minimum be leashed and under control of their owners at all times from April 1 – August 31. Pets should be prohibited on these beaches from April 1 – August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.	
Kite flying should be prohibited on beaches where plovers or terns nest from April 1 to August 31.	
Fireworks should be prohibited on beaches where plovers or terns nest from April 1 to August 31.	

[1] In addition, rearing or nursery areas used by unfledged or recently fledged tern chicks must be delineated with posts and signs or symbolic fencing no later than June 21.

[2] Essential vehicles (e.g., law enforcement) are defined pursuant to the Guidelines for Barrier Beach Management in Massachusetts (Massachusetts Barrier Beach Task Force 1994). See the Guidelines for a discussion of procedures for guided use of essential vehicles.

[3] When unfledged least tern chicks are present the 100-yard buffer is established from lines drawn through outermost nests of each colony, perpendicular to the long axis of the beach.

[4] The Federal Guidelines indicate that in most cases vehicle-free areas should extend at least 200 meters on each side of the nest during the first week following hatching. The width of the buffer may be adjusted based on observed chick mobility and frequency of monitoring, but may in no case be reduced to less than 100 meters. In some cases, highly mobile broods may require protected areas up to 1,000 meters, even where they are intensively monitored.

[5] Because least tern chicks disperse from nests shorter distances and at older ages than piping plover chicks, under some circumstances it may be possible to allow passage of vehicles through portions of protected least tern habitat if, in the opinion of the DFW, this can occur without substantially increasing threats to least tern chicks or their habitats.

Compliance with the most current State and Federal Guidelines is a prerequisite for plan participants seeking incidental take coverage via a COI under this Plan. This Plan will specify where deviations from the Guidelines will be allowed for covered activities. These deviations are designed to allow flexibility for plan participants, while maintaining appropriate conservation actions to avoid and/or minimize impacts associated with covered activities.

Monitoring

Monitoring of piping plover populations is an integral part of successfully implementing the Guidelines. For example, it is essential for managers to monitor scraping activities, nesting attempts, and unfledged chick movements and fledging dates when managing symbolic fencing and OSVs. At the same time, many beach operators have agreed to carry out monitoring and reporting that exceeds the minimum requirements necessary to implement the Guidelines or to allow others access to their property to conduct monitoring. For example, the vast majority of beach managers participate in the annual plover census and report detailed information on nesting attempts, nest locations, and causes of nest failure to the DFW. This information is critical to DFW and FWS biologists in tracking regional recovery and emerging threats and developing management recommendations.

Predator Exclosures

Predator exclosures have repeatedly been shown to significantly increase nest hatching rates (Hecht et al. 2014). Wide use of exclosures from the late 1990s to mid-2000s, coupled with improved management in accordance with the Guidelines, were likely the main factors driving the high productivity and population growth in Massachusetts observed during this period (see review by Hecht et al. 2014). In recent years however, there has been increasing concern that exclosures could be associated with increased rates of nest abandonment and adult mortality, which could significantly reduce the benefits of exclosures or even cause them to have a net negative effect on piping plover populations. This concern has led to decreased deployment of exclosures in Massachusetts, although they are still fairly widely used, particularly at sites with high predation pressure. A Structured Decision Making Workshop in December 2013 developed and tested a prototype decision-support model with potential to increase the efficacy of exclosures and identify site-specific environmental factors that affect the demographic benefits and risks of exclosures (Hecht et al. 2014). Regardless, beach managers in Massachusetts have shown a consistent willingness to deploy exclosures where appropriate, with up to 75% of Massachusetts nests exclosed in some years (DFW 1996).

Coordination of Conservation Efforts

The DFW coordinates piping plover conservation efforts by: (1) providing site-specific technical assistance and advice to beach managers making bird-related decisions, including recommendations to minimize effects on recreation while avoiding take; (2) working with partners to ensure adequate training for new beach managers and bird monitors; (3) coordinating annual piping plover censuses, and ensuring that Index Count, Total Count, and other data are collected and reported in accordance with established protocols (Division of Fisheries and Wildlife 2012); (4) collecting, compiling and reporting annual census and productivity results, and conducting data quality control; and (5) conducting regulatory reviews for MESA and Wetlands Protection Act compliance, when applicable.

2.4 Land Uses

This section provides an overview of relevant land ownership and land uses associated with Massachusetts's beaches, focusing on beaches supporting piping plovers that are publically owned or semi-public (i.e., privately owned but open to the public).

2.4.1 Land Ownership

Table 2-6 provides a summary of land ownership and use at all piping plover sites supporting five or more breeding pairs as of 2012. These 39 sites support approximately 73% of the breeding pairs in Massachusetts. It is important to note that in many cases, the definition of a site is somewhat arbitrary and may follow ownership boundaries or other landmarks rather than boundaries that are ecologically meaningful. For example, contiguous habitat along portions of the Cape Cod National Seashore is divided into several different sites for management purposes. All but one of the major sites shown in the table are partially or fully open to the public for recreational uses. This includes 16 municipal beaches (41%), 10 federal beaches (26%), 6 beaches owned by nongovernmental organizations (15%), and 4 state beaches (13%). One additional beach is owned jointly by the state and a nongovernmental organization. A snapshot of beach ownership for those sites supporting five or more breeding pairs is provided below.

All beaches owned by federal, state, or local governments, or by a nongovernmental organization, are protected open space where development is prohibited. Therefore, the great majority of habitat for piping plover is not under direct threat from development. Some beach sites have segments under private ownership (see Table 2-6). Ownership patterns at sites with fewer than 5 breeding pairs are generally similar, although with a somewhat higher percentage of sites under full or partial private ownership.

There are three federal properties supporting large numbers of breeding piping plovers (>20 breeding pairs): Cape Cod National Seashore (79 in 2012), Monomoy National Wildlife Refuge (37 in 2012), and Parker River National Wildlife Refuge (27 in 2012). Four state-owned properties collectively supported 29 piping plover pairs in 2012 at Revere Beach (10), Horseneck Beach State Reservation (7), Demarest Lloyd State Park (6), and South Cape Beach (6). Although piping plovers nest on many municipal properties throughout the state, the towns of Chatham and Barnstable support the greatest numbers of piping plovers on municipal property (123 and 56 pairs in 2012, respectively), followed by the Town of Plymouth (37 pairs in 2012, some shared with Duxbury) and the Town of Orleans (20 pairs in 2012). Crane Beach (The Trustees of Reservations), Duxbury Beach, and Little Beach/Barney's Joy (MassAudubon) are the largest piping plover sites owned by nongovernmental organizations.

Table 2-6. Land Ownership and Land Uses of All Massachusetts Beaches that Support at Least Five Nesting Piping Plovers

Site	Location	Ownership	Access	Ownership Type	Land Use	Recreational OSVs	Pairs 2013
South Beach (south end)	Chatham	Town of Chatham	Public	Municipal	General Recreation; some sections only accessible by boat	No	53
South Monomoy Island	Chatham	US Fish & Wildlife Service, Monomoy NWR	Public	Federal	Wildlife Refuge with compatible recreation; accessible by boat only	No	50
Parker River NWR	Newbury/ Rowley	US Fish & Wildlife Service, Parker River NWR	Public	Federal	Wildlife Refuge with bathing beach and other compatible recreation	No	32
Crane Beach	Ipswich	The Trustees of Reservations	Semi-public	Nongovernmental	Private Open Space open to the public; general recreation	No	28
Sandy Neck	Barnstable	Town of Barnstable	Public	Municipal	General Recreation; OSVs	Yes	27
North Beach Island	Chatham	Town of Chatham[1]	Public	Municipal	General recreation; accessible only by boat	No	22
Duxbury Beach	Duxbury/ Plymouth	Duxbury Beach Reservation, Inc.	Public[2]	Nongovernmental	General Recreation	Yes	17
Sampson's Island/ Dead Neck	Barnstable	MA Audubon Society & Three Bays Preservation	Semi-public	Nongovernmental	General Recreation	No	16
Plymouth Long Beach	Plymouth	Town of Plymouth[3]	Public	Municipal	General recreation; OSVs	Yes	15.5
Norton Point/ Leland/Cape Pogue Elbow	Chappaquiddick/Edgartown	Dukes County[4]/ Department of Fish and Game[4]	Public	Municipal / State & Nongovernmental	General Recreation; OSVs	Yes	15
North (Nauset) Beach	Orleans	Town of Orleans	Public	Municipal	General recreation; OSVs	Yes	14

Site	Location	Ownership	Access	Ownership Type	Land Use	Recreational OSVs	Pairs 2013
Nauset Spit (Heights)	Orleans	Town of Orleans	Public	Municipal	General recreation; OSVs	Yes	14
Race Point South	Provincetown	National Park Service	Public	Federal	General recreation; OSVs	Yes[5]	14
Little Beach/Barney's Joy	Dartmouth	MA Audubon Society & Private	Semi-public & Private	Nongovernmental[2]	Nature Sanctuary with compatible recreation; Private	No	14
North (Nauset) Beach	Chatham	Town of Chatham	Public	Municipal	General recreation; OSV's	Yes	13
South Beach (north end)	Chatham	Town of Chatham	Public	Municipal	General Recreation; some sections only accessible by boat	No	11
Marconi Beach	Wellfleet	National Park Service	Public	Federal	General Recreation	No	10
Revere Beach	Revere	Department of Conservation & Recreation	Public	State	General Recreation	No	9
Spring Hill Beach	Sandwich	Town of Sandwich[2]	Public	Municipal[6]	General Recreation	No	9
Great Island	Wellfleet	National Park Service	Public	Federal	General Recreation	No	9
Long Point/Wood End	Provincetown	National Park Service	Public	Federal	General Recreation	No	9
Horseneck Beach State Reservation	Westport	Department of Conservation & Recreation	Public	State	General Recreation	No	9
Eel Point	Nantucket	Nantucket Conservation Foundation & Private	Semi-public	Nongovernmental[2]	General Recreation	No[5]	9

Site	Location	Ownership	Access	Ownership Type	Land Use	Recreational OSVs	Pairs 2013
Seagull Beach	Yarmouth	Town of Yarmouth[2]	Public	Municipal[2]	General Recreation	No	8
Ballston Beach	Truro	National Park Service	Public	Federal	General Recreation	No	8
Squaw Island	Barnstable	Private	Private & Semi-public	Private	Recreation	No	7
Jeremy Point	Wellfleet	National Park Service	Public	Federal	General Recreation	No	7
Race Point North/Hatches Harbor	Provincetown	National Park Service	Public	Federal	General Recreation; OSVs	Yes	7
Edgartown Great Pond	Edgartown	Private[7]	Private & Semi-public	Private[7]	Private and General Recreation	No	7
Demarest Lloyd State Park	Dartmouth	Department of Conservation & Recreation	Public	State	General Recreation	No	7
West Dennis Beach	Dennis	Town of Dennis	Public	Municipal	General Recreation	No	7
West Island	Fairhaven	Town of Fairhaven & DCR	Public	Municipal	General Recreation	No	6
East Sandwich Beach	Sandwich	Town of Sandwich and Private	Public & Private	Municipal[2]	General Recreation	No	5
Dead Forest/Head of the Meadow	Truro	National Park Service	Public	Federal	General Recreation and Conservation	Yes	5

Site	Location	Ownership	Access	Ownership Type	Land Use	Recreational OSVs	Pairs 2013
Tisbury Great Pond/Quansoo	Chilmark	Martha's Vineyard Land Bank Commission/ Private	Public & Private	County & Private	General Recreation and Conservation	No	5
Dogfish Bar	Aquinnah	Town of Aquinnah & Private[4]	Public and Private	Municipal[2]	Private and General Recreation	No	5

Notes:
Table data sorted by the number of piping plover pairs observed in 2013.
1 Some inholdings owned by National Park Service and private landowners.
2 Portions of the habitat under private ownership.
3 Some small privately owned inholdings.
4 Managed by The Trustees of Reservations.
5 The majority of this area is closed to OSVs from April 1–July 20.
6 According to *Nantucket Beach Map 2014*, adjacent area is open to OSVs.
7 Small sections owned by Martha's Vineyard Land Bank and The Nature Conservancy.

2.4.1.1 Municipal Beaches

- Town of Chatham
- Town of Barnstable
- Town of Duxbury
- Town of Plymouth
- Town of Sandwich
- Town of Orleans
- Town of Dennis
- Town of Fairhaven
- Dukes County
- Town of Aquinnah
- Town of Yarmouth

2.4.1.2 Federal Beaches

- U.S. Fish & Wildlife Service, Monomoy National Wildlife Refuge
- U.S. Fish & Wildlife Service, Parker River National Wildlife Refuge
- National Park Service, Cape Cod National Seashore
- U.S. Army Corps of Engineers

2.4.1.3 Non-government Beaches

- The Trustees of Reservations
- Duxbury Beach Reservation, Inc.
- MA Audubon Society
- Three Bays Preservation
- Nantucket Conservation Foundation
- Private

2.4.1.4 State Beaches

- Department of Conservation & Recreation
- Department of Fish & Game

2.4.2 Recreation

Recreational uses on Massachusetts beaches vary widely and may include swimming, sunbathing, picnicking, pedestrian activity, dog-walking, fishing, nature study, beach sports, boating, water sports such as surfing and wind-surfing, camping, and the use of OSVs. As discussed elsewhere in

this document, relatively new recreational activities at some sites may include fat tire biking and kite boarding. The nature and intensity of recreational use varies widely among beaches due to beach characteristics, beach use regulations, and accessibility. For example, many beaches have limited parking, parking fees, or resident-only policies that limit the number of beach visitors and the intensity of use.

Recreational OSVs are permitted at 12 of the sites shown in Table 2-6, subject to various restrictions, including but not limited to seasonal closures to protect nesting shorebirds such as piping plovers (see discussion of management in accordance with the Guidelines, above). The following is a summary of public or semi-public beaches where recreational OSVs are permitted. OSV use generally requires a municipal permit and or permit issued by the landowner. At many sites, most OSV use is limited to specific OSV corridors, with vehicular access to the open beach limited to specific "cuts" or dune openings. Although many miles of beach may appear to be open to OSV use when examining published OSV routes, many major vehicle corridors are located behind dune systems that are currently a barrier to piping plover movement, especially if no bayside foraging habitat is present. This significantly reduces the linear extent of direct habitat impact by OSVs. Lawful use of OSVs requires that the property owner have an Order of Conditions pursuant to the Massachusetts Wetlands Protection Act. Some additional OSV use may occur on private beaches, but this is believed to be limited.

Cape Cod National Seashore, Provincetown and Truro

Portions of the Cape Cod National Seashore, on the ocean shore of Provincetown and Truro from Hatches Harbor to Longnook Beach, may be open to limited OSV use (National Park Service 2013). Significant restrictions may apply; including a long section of beach from Route 6A, Exit 8 to High Head that is closed to OSVs from April 1 to July 20 and an area from Coast Guard Beach to Longnook Beach where OSV use is limited to night fishing (see Figure 1.1 of National Park Service 2013). Permits are required and limited to 3,400 annually.

Town of Truro

The municipal OSV corridor is located on the bay side, with seasonal beach access points at Fisher beach, Corn Hill Beach, and Beach Point Landing (Town of Truro 2013). OSV use is limited to town residents with valid beach stickers.

Towns of Orleans/Chatham

Recreational OSV use is limited to Nauset Beach, Orleans, extending south to the beach terminus located in Chatham (Town of Orleans 2013). Annual resident and nonresident registration stickers are required. Driving on the north end of Nauset Beach is limited to Orleans residents only. The maximum number of OSVs allowed on Nauset Beach at any one time is 575; 200 north of the parking lot and 375 south of the parking lot.

Town of Dennis

Recreational OSV use is permitted at two sites, Crowes Pasture and Chapin Beach. Annual stickers are required and are available to residents and nonresidents. OSVs at Crowes Pasture and Chapin Beach are limited to maximum of 125 at each site at any one time (Town of Dennis 2014).

Town of Duxbury

OSV use at Duxbury Beach requires an annual permit. The Duxbury Beach Reservation leases the beach to the Town of Duxbury, which sells permits and manages OSV use on the beach. Off Road Vehicle numbers are limited by space availability, which is driven by beach closures to protect plover nesting activity, tide, wind direction and beach topography on any given year (Town of Duxbury undated).

Town of Barnstable

OSV use at Sandy Neck requires an annual permit, available to both residents and nonresidents (Town of Barnstable 2014). Off Road Vehicle numbers are limited by space availability, which is driven by beach closures to protect plover nesting activity, tide, wind direction and beach topography on any given year.

Town of Plymouth

A maximum of 225 OSVs at any one time are permitted on the northern section of Plymouth Long Beach. OSVs must display a sticker, available to Town of Plymouth residents only. Zone 4 is closed to vehicles year-round and Zone 3 is closed to vehicles from April 1 – September 30 (Town of Plymouth 2013).

Town of Nantucket

OSV use is permitted along several limited sections of municipal beach, as per the Nantucket Beach Map 2014 Rules and Regulations (Town of Nantucket 2014). Beaches where OSVs are permitted include portions of Nobadeer Beach, South Shore Beach, Madeket Beach, and 40th Pole. Town-issued beach stickers are required and are available to vehicles registered both on- and off-island.

Nantucket, Coskata Coatue Wildlife Refuge

Seasonal or day use OSV permits may be purchased from the Trustees of Reservations (Trustees of Reservations 2015a).

Martha's Vineyard, Norton Point and Long Point Wildlife Refuge

Seasonal permits may be purchased from the Trustees of Reservations (Trustees of Reservations 2015b).

Chapter 3
Covered Activities and Impact Analysis

3.1 Introduction

This chapter provides a detailed discussion of the proposed covered activities—those actions that have the potential to result in take of piping plovers and for which the DFW is requesting take authorization from the FWS. Some of the proposed covered activities include impact minimization measures that would significantly reduce the effects of the covered activities on piping plovers. Because the covered activities and their impact minimization measures are not severable, they are described together in this chapter. Additional, separate mitigation measures are described as part of the Conservation Strategy in Chapter 4.

In addition, this chapter provides a discussion of the potential impacts of covered activities on the piping plover and its habitat and quantifies the anticipated level of take. As part of this impact analysis, the chapter presents a mechanism for linking the proposed level of potential take in a given year to changes in the Massachusetts plover population as established by the preceding years' survey data. This approach ensures that the implementation of covered activities would have a negligible effect on the overall recovery of the species, even in the face of changed or unforeseen circumstances (and even without the benefits of the mitigation measures proposed in Chapter 4).

3.2 Covered Activities

This section describes each covered activity and the associated impact minimization measures that will be implemented when carrying out the covered activity. As discussed in Chapter 1, the covered activities are generally associated with the operation of public or semi-public recreational beaches. However, covered activities may also be implemented on private lands or in association with aquaculture operations.

Each plan participant will be required to develop and implement a DFW-approved, site-specific *impact avoidance and minimization plan* (IAMP), which will draw on the information and impact minimization measures outlined in this section of the Plan (see Chapter 5). As a result, the impact minimization measures outlined below are not intended to be formulaic and will need to be adapted by each plan participant to account for the unique needs and characteristics of their site. For example, depending on beach and parking lot characteristics, barriers to deter chicks from entering parking lots may be useful at some sites but not others. Similarly, monitoring requirements may vary over time in response to weather, brood location, time of year, site configuration, and levels of recreational beach usage. Therefore, it is important that this Plan provide flexibility to plan participants in developing their site-specific IAMPs, while still requiring them to draw on the measures described in this Plan to ensure the minimization of take.

Beyond the activity-specific impact minimization measures described here, this Plan provides strict statewide limits on the number of plover nests and broods that can annually be exposed to take. These limits will be adjusted in response to future changes in the Massachusetts piping plover population, thereby ensuring that implementation of the covered activities will have a less-than-

significant impact (see Section 3.3, *Impact Analysis*). In addition, take exposure at any one site (through all covered activities combined) is generally limited to 15% of breeding pairs at the site, further minimizing impacts on a site-specific basis (see Chapter 5).[11],[12] It should be noted that except for these specific covered activities, all other recreational and beach operation activities will be managed according to the Guidelines (i.e., all other take will be avoided through implementation of the Guidelines). Monitoring and reporting requirements for plan participants engaging in covered activities are described in Chapter 4.

The covered activities are divided into three categories based on the type of activity, each of which is described below.

1. Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks.
2. Recreation and Beach Operations.

a. Recreation and Beach Operations Associated with Reduced Symbolic Fencing Around Nests.

b. Recreation and Beach Operations Associated with Reduced Proactive Symbolic Fencing of Piping Plover Habitat.

c. Recreation and Beach Operations at Piping Plover Nest Sites with Nest Moving.

3. OSV Use in the Vicinity of Unfledged Piping Plover Chicks.

For each covered activity, the following discussion will describe in detail the **covered activity** including how the activity will be implemented, the **take mechanisms** associated with the covered activity, the **current practices** under the Guidelines, **the conditions on the covered activity** which consist of the suite of impact minimization measures that plan participants will be required to conduct when implementing the covered activity, and the **monitoring** associated with the activity. Because Covered Activity 2 (Recreation and Beach Operations) will always occur as one of the three scenarios listed above (items 2.a through 2.c), each of these scenarios will be discussed separately. In addition, because Recreation and Beach Operations associated with reduced symbolic fencing (items 2.a and 2.b) may involve beach raking in the areas of reduced fencing at some sites, the implications of this activity are also described below. Figure 3-1 illustrates the take mechanisms associated with each covered activity.

[11] The DFW may increase the allowable exposure to 30% at up to five sites per year (see Section 5.2.2.3).

[12] As further described in Chapter 5, potential plan participants requesting a COI will need to describe and provide a map of the site boundaries, and show proof of ownership or the owners' written assent to the COI request.

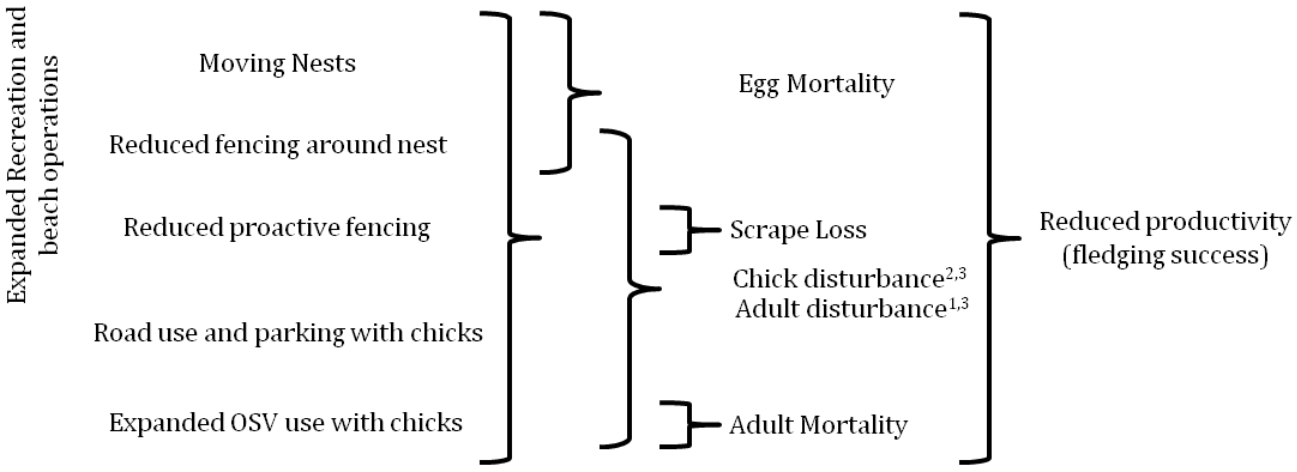


Figure 3-1. Overview of Take Mechanisms Associated with the Covered Activities

[1] Adult disturbance is assumed to decrease productivity, but not adult survivorship, with the exception of the covered activity, "road use and parking" where a small amount of adult mortality is assumed (see text).

[2] In addition to chick mortality, chick disturbance could result in reduced post-fledging survivorship. Although no attempt is made to quantify this effect, this impact is addressed indirectly by assuming a very conservative reduced productivity estimate that indirectly accounts for this effect.

[3] Depending on the circumstances, disturbance may or may not rise to the level of harassment or take.

3.2.1 Use of Roads and Parking Lots in the Vicinity of Unfledged Piping Plover Chicks

Covered Activity: Road and parking lot use occurs in association with summer recreational beach use. Allowing limited driving past unfledged chicks would prevent closings of parking lots and beach access roads, as well as other roads located adjacent to breeding habitat. Specifically, this covered activity would allow driving on improved roads[13] and parking lots when adult plovers and unfledged chicks are present.

Take Mechanisms: In general, parking lots and roads are transit areas for piping plovers accessing suitable habitat on both sides of a road and do not provide suitable feeding, nesting, or sheltering habitat. Therefore, birds are not likely to spend large amounts of time on these surfaces (an exception, piping plovers nesting in parking lots, is considered below in Section 3.2.2). However, unfledged chicks are exposed to mortality risk when crossing roads and parking lots if vehicles are present.

Road use and parking in the vicinity of unfledged chicks has the potential to disturb or harass adult and juvenile piping plovers by disrupting normal movement patterns as they move between breeding, feeding, and sheltering habitat. Vehicle use in close proximity to the birds may alter or

[13] An improved road is a paved, gravel, or otherwise actively maintained traveled way. Improved roads have been graded, realigned, resurfaced, and or altered through significant drainage improvements. Most sand tracks and corridors used by OSVs would not be considered improved roads.

even temporally prevent movements between these habitat features. In addition, vehicle use in these areas may result in harm (i.e., death or injury) to chicks and possibly even adults by crushing unfledged chicks or striking adults.

Current Practices: The Guidelines prohibit road use and parking where unfledged chicks are present.

Conditions on the Covered Activity: Impact minimization measures will limit the amount of take (i.e., both harassment and harm) by reducing the exposure of chicks and adults to vehicles on beach access roads and in parking lots. However, these measures deviate from those in the Guidelines by allowing vehicles to drive on roads and park in parking lots that are being actively used by adult and unfledged plover chicks, which is currently prohibited. Therefore, there is an increased risk of take from this covered activity under this Plan.

Conditions:

- ✓ Barriers
- ✓ Signage

A suite of impact minimization measures are potentially appropriate when implementing this covered activity, based on site-specific characteristics. Site-specific IAMP s provided by plan participants to the DFW will need to identify which measures are most appropriate for their site and describe in detail how they will be implemented. Appropriate measures include: (1) barriers to prevent adults and chicks from accessing road and parking areas, (2) signage, (3) staff training, and (4) managing traffic during periods when birds are crossing. In addition, intensive monitoring will be required when chicks are near roads and parking lots. Each of these measures is described in greater detail below.

Barriers: At some sites, the deployment of barriers, such as silt fencing, is likely to be effective at preventing chicks from accessing roads or parking areas. For example, if unfledged chicks are passing through a parking lot located at a road terminus to move from beachfront to bayside foraging areas, a barrier could be effective at preventing access to the high-risk parking lot while not unduly hindering important chick movements. In contrast, in other settings such as a parking lot located in the middle of a longer road, deployment of a barrier might simply shift the crossing point from parking lot to road and not necessarily reduce the disturbance and/or mortality risk. At a site with a long through road and no clear chick crossing "hotspots," deployment of a long barrier could have a negative impact by significantly hindering chick movement, preventing access to important feeding areas, and possibly increasing predation risk. Given these concerns, long barriers are unlikely to be cost-effective in most settings. However, at sites with little or no bayside foraging habitat and a history of chicks entering roads or parking lots, barriers could be considered. Site-specific IAMPs that include this covered activity need to evaluate the appropriateness and feasibility of implementing barriers.

Signage: Signage alerting motorists to watch for crossing birds and to obey speed limits should be strategically deployed. At some sites, signs requesting motorists and beach goers to alert staff if they observe piping plovers in or near a road or parking lot may be appropriate. Site-specific IAMPs will need to address whether and how signage will be implemented with regard to this covered activity.

Staff Training: Plan participants implementing this covered activity are required to employ shorebird monitors and parking attendants with adequate training prior to implementation. Training conducted by beach managers and or other qualified staff will ensure that all relevant staff understand basic piping plover biology and behavior, their respective roles and

responsibilities, communication procedures, and contingencies. Site-specific IAMPs need to identify those personnel to receive training and provide specific details regarding the training to be provided.

Managing traffic: Each IAMP is required to include a protocol to be followed when chicks and tending adults are detected in a parking lot or road. This protocol might include temporarily rerouting traffic away from a section of a parking lot with chicks, having a monitor or parking attendant approach the chicks to herd them out of a parking lot or across a road, reduced speed limits, or temporary road closures to allow chicks to pass. The distance between chicks and the parking lot or road that triggers a brief closure will be made on a case-by-case basis. A general distance may be specified in the IAMP but may be subject to change based on the specific physical features of the site. A detailed description of communication procedures is a required component of IAMP for this activity, as communication among staff is critical to ensure traffic safety and to minimize the risk to chicks.

Monitoring: Regular monitoring of broods located in the vicinity of roads and parking lots will reduce the risk that chicks cross into traffic without adequate protective measures in place; as a result, plan participants need to include monitoring plans in their IAMPs for this covered activity. However, development of site-specific monitoring plans is complicated by the fact that the likelihood of chicks entering roads or parking areas may vary significantly among sites and within sites between years. For example, chick entry into a parking lot may be a yearly occurrence at some sites but may only occur once every few years at another. For example, there may be a small overwash area near a parking lot that supports a nest in some years. In years when no nest is present in this area, the likelihood of chicks entering a parking lot may be very low. In other cases, a brood may be observed near a parking lot initially, but may relocate to feeding flats hundreds of yards from a parking area, thereby reducing the need for frequent monitoring.

Because the likelihood of chicks being present in roads and parking lots may vary significantly among sites and between years, site-specific monitoring plans must take into account the site history and configuration and balance risk reduction with cost and staffing demands. The following principles should be applied in developing site-specific monitoring plans.

1. Monitoring intensity should increase the closer nests or chicks are observed in proximity to a parking lot and road and the more frequently chicks are observed there. As a general guideline, if a brood consistently remains more than 100 yards from the nearest road, the plan participant will apply general monitoring in accordance with the State Guidelines and their site-specific management plan.[14] Broods showing a tendency to occur within 50–100 yards of the target road or parking lot should be monitored at least twice per day, or more frequently during high traffic periods. Broods observed less than 50 yards from a road or parking area, and especially chicks that have shown a history of entering a road or parking area, should be monitored even more frequently. This might range from four or more monitoring checks per day, to continuous monitoring during high-use periods at high traffic sites (e.g., 10 AM–4 PM on a warm, sunny weekend).
2. Monitoring should be carried out by qualified shorebird monitors.

[14] Broods may be monitored from three times per week to twice per day or more, depending on a variety of factors.

3. Monitoring intensity should increase during high traffic periods (e.g., warm, sunny weekends).
4. Monitoring intensity should increase once chicks have been observed crossing a road or parking area as past use is a likely predictor of future use.
5. Less intensive monitoring is allowed at sites where a barrier system can be implemented, provided monitoring in previous years shows that the barrier is effective at preventing crossings.

Conditions:

- ✓ No less than 10 yards
- ✓ Larger fenced buffer initially
- ✓ Gradual reduction in fencing buffer

3.2.2 Recreation and Beach Operations

This covered activity will always occur as one of the three scenarios described in Sections 3.2.2.1 through 3.2.2.3.

3.2.2.1 Recreation and Beach Operations Associated With Reduced Symbolic Fencing Around Nests

Covered Activity Scenario: Recreational and beach operational activities will be allowed to occur in areas less than 50 yards from a nest that would otherwise have been symbolically fenced and restricted from use under the Guidelines.

Take Mechanisms: Recreational and beach operational activities in the immediate vicinity of nests have the potential to result in disturbance or harassment of nesting adults and to result in egg mortality through increased risk of nest abandonment or lower hatch rates due to inconsistent incubation. Although not the primary take mechanism, increased recreational activity in areas of reduced symbolic fencing could also result in some increased disturbance, harassment, or harm of unfledged chicks after hatching.

Current Practices: According to the Guidelines, nests should be symbolically fenced for at least 50 yards around the nest, above the high-tide line, to minimize disturbance and avoid take. In some cases, maintaining a full 50-yard buffer may significantly reduce recreational use. For example, if piping plovers nest within 50 yards of a major beach access point, symbolic fencing could close that access point. The DFW and the FWS have allowed limited attempts to gradually reduce symbolic fencing at high use pedestrian beaches with intensive monitoring (generally daily), and these attempts have shown that incubating adults can in some cases tolerate reduced buffers and continue normal incubation behavior. In these cases, beach managers are required to re-expand the fencing, as necessary, to prevent disturbance. While current practices may continue without Plan coverage, including reduced fencing around nests as a covered activity will allow the DFW to authorize this activity with less intensive monitoring, without the requirement to re-expand fencing, and in cases where current practices would strictly prohibit reduced fencing (e.g., next to a major OSV travel corridor).

Conditions on this Covered Activity Scenario: Site-specific IAMPs for this covered activity scenario must include the following elements.

1. Fencing should only be reduced to the extent necessary to achieve specific recreational or beach operations objectives (e.g., opening a specific beach access trail). Symbolically fenced buffers should not be reduced to less than 10 yards; however, limited exceptions may be permitted provided that the fencing is reduced gradually and that the plan participant

demonstrates a compelling need to maintain reasonable recreational and beach operational use. For example, if a nest is located less than 10 yards from a major beach access trail, the DFW may allow less than 10 yards of fencing rather than authorize nest moving associated with Covered Activity 2.c (see Section 3.2.2.3). The extent of all proposed fence reductions must be included in the IAMP and approved by the DFW based on consideration of the circumstances at a given site in a given year.

2. A fenced buffer larger than the target buffer will be established initially and maintained during egg laying and through at least the first 24 hours after clutch completion. The DFW recognizes that the full 50-yard buffer may not be practical in all cases, but every effort should be made to maximize fencing distance from the nest during this sensitive period.
3. Fencing distance from the nest should be gradually reduced, in increments of approximately 10 yards, no more than once daily.

Monitoring: The IAMP needs to describe the monitoring plan associated with this covered activity. Monitoring during early nesting phases will document the effectiveness of the reduced buffer by the incubating adults. Monitoring should be focused on early periods of intensive recreational use (for example, the first weekend after the fencing is reduced).

3.2.2.2 Recreation and Beach Operations Associated With Reduced Proactive Fencing of Habitat

Covered Activity Scenario: Recreational and beach operational activities will be allowed to occur in suitable piping plover nesting, feeding and sheltering habitat that would otherwise be restricted by the placement of proactive symbolic fencing in accordance with the Guidelines—particularly in sections of beach near major access points that tend to have high recreational use. The DFW reserves the right to reject some proposals for this covered activity in the event that DFW determines that the symbolic fencing is not significantly impairing access or recreational activities at the site. In addition, the DFW will require general limits on the total area of reduced fencing at a given site, as described below.

Take Mechanisms: Increased recreational activities and beach operations within areas of suitable nesting habitat that are not symbolically fenced have the potential to result in disturbance or harassment of nesting adults, potentially forcing them to seek out alternative nesting habitat. This covered activity scenario could also potentially preclude adults from attempting to nest or renest in affected areas if the unfenced area is subject to heavy recreational use. This covered activity scenario could also result in some increased disturbance or harassment of unfledged piping plover chicks, as symbolic fencing protects chick sheltering, and to a certain extent feeding habitat, in addition to protecting courtship and nesting habitat. However, because the vast majority of symbolic fencing at a given site would remain, including adequate fencing around each breeding pair's nest, the DFW believes that increases in chick disturbance will be minimal and are unlikely to rise to the level of take (i.e., harassment or harm).

This covered activity scenario could also result in indirect effects on adult nesting and fledging success in the event that affected adults relocate to poorer-quality habitat or face increased intraspecific competition. For example, a displaced breeding pair may nest in an area with poorer chick foraging habitat or an increased risk of storms overwashing nests. Conversely, as this covered activity scenario will take place in high use recreational areas, reduced fencing early in the season

may actually benefit displaced pairs by causing them to avoid nesting in areas of particularly high recreational use.

Assuming that there will be some negative indirect effects due to this covered activity scenario, these effects would be minimized by requiring that this covered activity be limited to 10% or 2 acres of available nesting habitat at a given breeding site, whichever is less (see *Conditions on this Covered Activity Scenario* for limited exceptions). Due to this site-specific limit, and the DFW's discretion to reject reduced proactive fencing proposals, the effects of this activity are expected to be modest. For example, due to the requirement to maintain the vast majority of fencing at a given site, breeding pairs will likely only shift breeding locations within a site, in many cases, rather than being displaced to other breeding locations. Although it has been suggested that reduced proactive fencing could harm displaced breeding adults or result in increased mortality risk, there is no evidence to support this, and the DFW does not believe that the activity as proposed will result in increased adult mortality.

Theoretically, if the Massachusetts or New England piping plover population were at or above carrying capacity this covered activity scenario could slightly reduce the potential population size by temporarily reducing the availability of habitat. However, this is not a significant concern because of the limited scope of the proposed activity both on a statewide and site-specific basis. Furthermore, as described in the Piping Plover Recovery Plan (FWS 1996a), experts have suggested that the Massachusetts piping plover population remains well below carrying capacity (DFW 1996).

Conditions:

- ✓ High use recreational areas only
- ✓ Retain most symbolic fencing: reduced fencing no more than 10% or 2 acres
- ✓ No more than 15% of breeding pairs at a given site exposed.

Although beach raking is an uncommon practice in Massachusetts, at some beaches with active beach raking operations, beach raking in areas of reduced symbolic fencing could result in the destruction of scrapes and the disturbance or harassment of courting and scraping adults. The DFW has a longstanding practice of imposing conditions on beach raking operations to avoid take and adverse effects on piping plover habitat pursuant to MESA and the Massachusetts Wetlands Protection Act. These conditions may include, but are not limited to, limits on the frequency, duration, and areal extent of raking, intensive monitoring of adults and chicks by qualified shorebird monitors during raking operations, a monitor walking in front of the beach rake, maintenance of setbacks between raking equipment and unfledged chicks, and retention of beach wrack and vegetation. Because the MESA permit and the Order of Conditions under the Massachusetts Wetlands Protection Act require measures to avoid take from beach raking, these conditions would continue to apply under this Plan. Because these conditions would continue to apply (with the exception of some symbolic fencing as described in the Plan), beach raking in conjunction with reduced symbolic fencing will not result in take of nests, harassment or harm to adults, fledglings, or unfledged chicks, or impacts to habitat (e.g., wrack) that would significantly impair feeding, sheltering or other behaviors. Beach raking during the courtship period may be considered an impact minimization measure because deterring nesting in high recreational use areas not subject to symbolic fencing may be less harmful than persistent nesting attempts and egg-laying (see discussion below). A request to carry out beach raking in conjunction with reduced fencing will be treated as a single take exposure (see Chapter 5).

Current Practices: As described in Chapter 2, most suitable nesting habitat in Massachusetts is delineated with symbolic fencing prior to nesting or at the first signs of courtship or scraping behavior to minimize the disturbance of breeding piping plovers.

Conditions on this Covered Activity Scenario: The primary impact minimization measure for this covered activity scenario is to maintain the great majority of symbolic fencing at any given site. As noted above, this will generally be accomplished by limiting reduced proactive symbolic fencing at any given site to 10% or 2 acres of the available nesting habitat; however, at up to five sites statewide, the DFW may allow reduced proactive fencing of up to 20% of habitat or 4 acres, whichever is less (see Section 5.2.2.3). This measure will minimize the risk of displacing a breeding pair from a given site or of significantly increasing competition from other pairs of piping plovers. In addition, the number of breeding pairs that may be exposed to all covered activities at a given site is limited to 15% of breeding pairs present during the previous breeding season (see Chapter 5). This further limits the extent of reduced proactive fencing that a plan participant is likely to request because sites with fewer than 14 breeding pairs would not be allowed to affect more than one breeding territory.

Because this activity will be carried out in high use recreational areas, the DFW will allow beach raking (subject to the conditions described above) or the temporary placement of material such as boards on the beach to deter nesting as part of the plan participant's IAMP; such measures must be outlined in the IAMP. These activities may reduce the risk that piping plovers will nest in unfenced areas with a higher potential for disturbance associated with recreational activities. Should piping plovers nest despite the lack of symbolic fencing, plan participants would need to immediately install symbolic fencing around the nest to limit disturbance and prevent the destruction of eggs, consistent with the covered activity scenario of reducing fencing buffers around nests, described in Section 3.2.2.1.

Monitoring: The IAMP needs to describe the monitoring plan associated with this covered activity. The area subject to reduced fencing needs to be monitored for plover activity. Monitoring efforts will generally be consistent with the baseline plover monitoring efforts carried out in accordance with the Guidelines, as the main purpose is to detect breeding activity or nesting within the unfenced area.

3.2.2.3 Recreation and Beach Operations at Piping Plover Nests with Nest Moving

Covered Activity Scenario: Recreational activities and certain beach operations (e.g., operating a parking lot) will be allowed in the immediate vicinity of piping plover nest sites, subject to the impact minimization measures set forth in this Plan. If piping plovers nest in a parking lot, major beach access trail, OSV corridor or "cut",[15] or other high use recreational area (e.g., the site of an annual beach festival or in front of a train station), reduced symbolic fencing may not be sufficient to facilitate the covered activity (e.g., opening a beach access trail or parking lot), or may not be the best way to minimize impacts to piping plovers (e.g., maintaining a small area of reduced fencing around a nest in the middle of a parking lot may present a greater risk than attempting to move the nest). If the DFW determines that nest moving is the best impact minimization measure at a given

[15] A cut is a previously established trail, often through a dune system, to allow OSV access from an OSV travel corridor to the front beach.

site, the DFW will authorize a qualified shorebird monitor, trained in nest moving procedures by the DFW, to move a nest using the nest moving protocols described below. Before authorizing nest moving, the DFW would work with the plan participant to determine whether nest moving is necessary or whether the same or similar result could be achieved with other approaches, such as through reduced symbolic fencing around the nest.

Take Mechanisms: Without nest moving as an impact minimization measure, this covered activity could result in the disturbance or harassment of adult piping plovers and an extremely high probability of nest abandonment or destruction. Nest moving could result in disturbance or harassment of nesting adults and a risk of egg mortality through increased risk of nest abandonment. However, nest moving has been proven to be an effective conservation action of last resort to prevent piping plover nest inundation elsewhere in the species range (Prellwitz et al. 1995; Gordon and Kruse 1999).

Current Practices: Symbolic fencing must be placed in active courtship areas and around nests consistent with the Guidelines, and this requirement can result in closures of parking lots, beach access roads and paths, OSV corridors, and other significant restrictions on beach recreational and operational activities. Nest moving is not allowed by the Guidelines because it would result in take of piping plovers.

Conditions on this Covered Activity Scenario: In the event that a plan participant is authorized by the DFW to move a nest, the plan participant will develop a site-specific IAMP following the measures described in this Plan, which closely follows the recommendations of Gordon and Kruse (1999). The DFW must review and approve the IAMP prior to the nest being moved. The IAMP will include the following elements.

1. Nests will not be moved until at least 48 hours after the clutch is completed.
2. Nests will not be moved during inclement weather, in extreme heat, or during evening hours.[16]
3. An appropriate relocation site will be chosen in suitable habitat that minimizes the movement distance to the extent practicable. However, the DFW may approve a greater movement distance in order to minimize disturbance to the nest after relocation, or disruption of breeding by adjacent pairs. For example, it may be preferable to move the nest a greater distance to a site that is visually isolated or further away from an OSV corridor.
4. Nests will be moved using the "cylinder/plate/platform method" (Gordon and Kruse 1999). This method allows the intact nest cup, with eggs, to be moved intact in a large cylinder pressed into the substrate around the nest. The excavated nest is then placed on a platform with adequate drainage to allow for rapid repeated movement of the nest over small distances, if necessary. Visual landmarks (i.e., rocks, sticks) are moved with the nest to serve as visual cues. If a nest is located in cobble it will be moved by re-creating a new nest cup at the new location (on a platform if multiple moves are anticipated), as the

Conditions:

- ✓ IAMP Wait 24 hours after nest is complete
- ✓ Weather restrictions
- ✓ Artificial scrape
- ✓ Gradual process

[16] Two hours prior to sunset or later.

cylinder method would not be feasible in that substrate (for details, see Gordon and Kruse 1999).

5. Nests will be moved gradually to reduce the risk of abandonment. The first move will generally be less than 15 feet; however, distances may vary site by site.

a. If incubation is not resumed within 1.5 hours, the nest will be moved halfway back to the original nest location and monitored for signs of incubation.

b. If incubation is observed at the relocated nest, the nest should be monitored for 90 minutes to ensure consistent incubation behavior before attempting to move the nest a second time.

c. The nest may then be moved repeatedly, up to two times per day, in 10-20 foot increments following this monitoring procedure. The DFW may allow up to three movements per day once procedures for repeated nest-moving have been tested and proven.

d. If inconsistent incubation or significant distress behavior is observed, nest movement should be halted and resumed the next day.

e. If the first attempt to move the nest is unsuccessful, nest moving may be attempted again the following day.

f. In cases where parent birds fail to accept the moved nest, the DFW should be consulted to determine the best course of action.

6. The DFW may modify the recommended nest moving procedures as new information becomes available as part of the adaptive management plan for this HCP.

Monitoring: The IAMP needs to describe the monitoring plan associated with this covered activity. The nests that are moved will be monitored from a distance to confirm acceptance and incubation per the procedures described above. Nests will continue to be monitored until hatching in accordance with the Guidelines and statewide monitoring efforts.

3.2.3 Oversand Vehicle (OSV) Use in Vicinity of Unfledged Chicks

Covered Activity: This covered activity allows limited, *escorted* driving of non-essential OSVs[17] within the 100-yard or greater OSV setback from unfledged piping plover chicks required by the Guidelines.[18] The majority of OSVs are expected to be recreational, although some could be used for other purposes (e.g., tending oyster bed aquaculture beds). The Guidelines allow OSV use outside of the piping plover breeding season and during the pre-nesting, egg-laying, incubation, and post-fledging periods. Therefore, the need for incidental take coverage related to this covered activity is specific to the pre-fledging period (i.e., after chicks have hatched but before they have fledged).

Take Mechanisms: Escorted OSV use in the vicinity of unfledged chicks has the potential to disturb or harass tending adult and juvenile piping plovers foraging, resting, or moving through the area and to result in the injury or mortality of unfledged chicks. In part because of pedestrian escort requirements (see the *Conditions on the Covered Activity* discussion below), this covered activity is

[17] Essential OSVs are defined as those used by shorebird monitors, law enforcement, beach homeowners, or others as described in the Guidelines.

[18] The required state and federal setbacks and methods for delineating them are summarized in Table 2-5.

not expected to present a more than *de minimis* risk of mortality to adult piping plovers because of their maneuverability and capacity for flight.

OSV use also has some limited potential to result in the alteration of feeding and sheltering habitat through the destruction of beach wrack and vegetation. However, because OSV use in the vicinity of chicks will be limited to a narrow OSV corridor located to avoid and minimize impacts to wrack, and because OSV ruts must be smoothed out at least once daily when chicks are less than 14 days old (see the *Conditions on the Covered Activity* discussion below), this covered activity is not expected to result in any short- or long-term adverse effects to piping plover habitat. Plan participants proposing this covered activity will be required to comply with the relevant portions of the Guidelines for Barrier Beach Management in Massachusetts (Massachusetts Barrier Beach Task Force 1994) and the Massachusetts Wetlands Protection Act, which will further ensure that this covered activity will not significantly impair habitat function.

Current Practices: The Guidelines currently allow OSV use prior to egg-hatching and after chick fledging. When unfledged chicks are present, the Federal Guidelines call fora vehicle free area extending 1000 meters on each side of a line drawn through the *nest site* and perpendicular to the long axis of the beach. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation or other naturally occurring obstacles (See Table 2-5 for a description of the setbacks under the State Guidelines). The Federal Guidelines also grant state wildlife agencies such as the DFW the authority to approve plans developed by beach operators that allow for reductions in the width of the vehicle free zone based on adequate biological monitoring. The Federal Guidelines state that unless substantial data from past years show that broods on a site stay very close to their nest locations, vehicle free areas should extend at least 200 meters on each side of the *nest site* during the first week following hatching. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, but in no case should it be reduced to less than 100 meters on each side *of the brood*. In some cases, highly mobile broods may require protected areas up to 1000 meters, even where they are intensively monitored (FWS 1994).

Conditions on the Covered Activity: Plan participants should incorporate the impact minimization measures outlined below into their site-specific IAMP for this covered activity. These measures are expected to be applied at most sites; however, at sites with very little beach traffic, some of these measures may not be necessary. Any deviations from these impact minimization measures at a given site must be addressed in the IAMP.

Narrow Vehicle Corridor, No Parking: Travel in the vicinity of unfledged chicks will be restricted to a single, clearly demarcated vehicle travel corridor less than 5 yards wide. Parking will not be allowed within 200 meters of unfledged chicks during the first week after hatching, and in no event will parking be permitted within 100 meters of unfledged chicks (see discussion of Federal Guidelines, above). Because chicks are mobile, plan participants will be encouraged to establish a restricted parking zone considerably farther than 100 yards from unfledged chicks in order to reduce the need for constant monitoring of chicks and readjustment of vehicle parking during the course of the day. Exceptions to this rule may be approved by the DFW in limited circumstances. For example, at a site with little traffic (e.g., small numbers of aquaculturists tending oyster beds), a defined vehicle corridor may not be necessary.

Restricted Travel Hours: To limit disturbance of chicks and impacts on foraging, vehicle travel in the vicinity of chicks will be restricted to no more than 6 hours per day in 2–3 travel periods

during daylight hours. For example, vehicle travel would be restricted to several hours in the morning and late afternoon to access and exit the beach. The IAMP for each site will specify the restricted vehicle travel timeframes for that site.

Vehicle Escorting: Vehicle escorting will be performed in addition to the stationary monitoring of chicks described above, using one of two options.

- Each vehicle must be escorted by a passenger who walks in front of the vehicle (self-escorting), scanning for chicks.
- A single escort must walk in front of a caravan of 50 vehicles, scanning for chicks.

In lieu of the single pedestrian caravan escort, the DFW may approve a qualified shorebird monitor driving in an open top OSV at a speed of 5 mph or less. In any case, the escorts must have the ability to stop vehicle travel in the event that chicks approach or enter the travel corridor. Vehicle escorting will begin at least 200 feet from the closest chick and terminate 200 feet past the last chick in a given brood.

Staff Training, Enforcement, and Communication: Careful coordination among staff is essential to ensure proper implementation, enforce violations of OSV rules and procedures, and respond to emergency situations. IAMPs should include implementation measures to address issues such as enforcing restricted driving hours and escorting procedures, communication amongst monitors, beach access attendants, law enforcement, and other staff, and protocols for escorting vehicles off the beach during emergencies.

Mandatory OSV Operator Education: All OSV users participating in the escort program must undergo a mandatory orientation each beach season prior to implementation of the escort program. Training should include a written quiz to document familiarity with rules and procedures.

Conditions:

- ✓ Narrow corridor/no parking
- ✓ Restricted travel hours
- ✓ Vehicle escorting
- ✓ Staff training
- ✓ OSV operator education
- ✓ Smoothing of tire ruts

Smoothing of Tire Ruts: Tire ruts must be smoothed out at least once per day in the travel corridor, at the end of a travel period, to minimize the risk of plovers or other sensitive species sheltering in the tire ruts. Tire rut smoothing can be performed either by hand-raking or by dragging appropriate equipment behind a vehicle. If mechanized equipment is used, a pedestrian escort is required. The smoothing ruts requirement may be waived if all chicks present near the travel corridor are more than 14 days old.

Monitoring: The IAMP needs to describe the monitoring plan associated with this covered activity. Continuous monitoring of chicks by qualified monitors should be conducted during the travel hours when vehicles are present. Each monitor should be responsible for monitoring no more than one brood. In addition, a "compliance monitor" will be stationed adjacent to the vehicle corridor and will have radio contact with the brood monitors. This will enable the monitors to stop vehicle travel in the event that chicks approach or enter the travel corridor. Plan participants will need to demonstrate adequate staffing to implement both routine monitoring elsewhere on the beach and the vehicle escort program simultaneously. Monitors will also be used to escort vehicle caravans.

3.3 Impact Analysis

3.3.1 Introduction and Approach

This impact analysis discusses the effects of the covered activities on the piping plover and its habitat and includes an estimate of the level of take associated with implementation of covered activities. Direct, indirect, and cumulative effects on the piping plover and its habitat are all considered. No effects on critical habitat are anticipated because none has been designated for the breeding range of the Atlantic Coast population of piping plover (see Chapter 2).

Direct effects are those effects that are directly caused by the covered activities outlined in this Plan. Examples include nest abandonments or reduced fledging success resulting from implementation of the covered activities.

Indirect effects are those effects caused by the covered activities that take place later in time than the activity but are still reasonably certain to occur. An example of an indirect effect would be future degradation in habitat quality resulting from increased OSV use or beach raking.

Cumulative effects are defined under the ESA regulations as the effects of future state or private activities—not involving federal activities—that are reasonably certain to occur within the action area of a federal action subject to consultation (see 50 CFR 402.02). Note that cumulative impacts are defined more broadly under NEPA as the impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions (see 40 CFR 1508.7). Therefore, the cumulative impact analysis for the NEPA document associated with this HCP will include consideration of state, private, and federal projects and all projects with a federal nexus. The cumulative effects analysis for this HCP will be more limited in scope.

3.3.2 Effects on Piping Plover

3.3.2.1 Statewide Limits on Take Exposure

A key element of this Plan is the mechanism that ties the level of exposure to potential take in a given year to trends in the Massachusetts breeding population of piping plovers over time. Under this mechanism, as the statewide population of piping plovers increases, more take exposure allowances will be authorized to plan participants and a greater number of broods of chicks, nests, and breeding territories may be exposed to potential take. Conversely, if the plover population declines, fewer take exposure allowances will be authorized, and if the statewide population drops below 500 pairs, no take exposure allowances will be authorized, regardless of when this might occur during the 25-year permit term. In all cases, only a small proportion of Massachusetts breeding pairs will be exposed to the covered activities (1–7% depending on population size; see Table 3-1). If the Massachusetts population were to drop to 500 pairs (80% of the New England recovery unit goal of 625), no take exposure allowances would be authorized by the DFW, thereby ensuring that Massachusetts will continue to contribute proportionately to New England piping plover recovery (as Massachusetts currently supports about 75% of New England's breeding pairs). This mechanism, is both highly protective, and will also incentivize plan participants to work collectively and proactively to maintain or increase the piping plover population. Moreover, because

greater take exposure allowances require increased mitigation, increased take exposure allowances will *not* lead to greater net impacts on the population (see Section 4.3.3). On the contrary, because of the effectiveness of the mitigation strategy, the net benefits of the plan would actually *increase* if the population remains high, leading to high rates of plan participation.

The limits on exposure to take are shown in Table 3-1 and ensure that impacts associated with implementation of the Plan will be minimal, even without the additional mitigation proposed in Chapter 4. Furthermore, outside threats (e.g., climate change, disease, increased predation) that could reduce the population of piping plovers would automatically result in a reduced amount of take exposure allowances. As such, this approach provides a built-in mechanism to address concerns that could arise from underestimating the cumulative effects of activities or threats outside of the control of this the Plan.

Table 3-1. Statewide Limits on Maximum Number of Broods of Chicks, Nests, and Territories to be Exposed to Covered Activities and Potential Take

MA Breeding Population Size Prior 3–Year Average		Maximum Exposure to Take	
% of New England Recovery Unit Goal	# Breeding Pairs (3-Year Rolling Average)[1]	% of Breeding Pairs	# Nests/Broods/Territories[2]
≥105	>655	7	45[3] +
100–104	625–655	6	37–39
95–99	594–624	5	29–31
90–94	563–593	4	22–23
85–89	532–562	2	10–11
80–84	500–531	1	5
<80	<500	0	0

[1] Adjusted total count (see Chapter 4 for additional details).
[2] Includes temporary reduction in available nesting habitat due to reduced proactive fencing.
[3] This is 7% of the # breeding pairs for all values >655, rounded down to the nearest whole number. For example if the three-year average population size is 725 pairs, then this value would be 50.

To limit cumulative statewide impacts to piping plover, the limits on take exposure shown in Table 3-1 are intended to apply to all future or current individual ITPs for piping plovers pertaining to recreational beach activities or operations issued by the FWS for such activities in Massachusetts (including, but not limited to, the ITP issued to the Town of Orleans in 2015). The DFW will also apply the statewide take exposure limits in Table 3-1 to any take authorizations for recreational activities or beach operations made by the FWS for federal actions pursuant to Section 7 of the ESA (e.g., at the Cape Cod National Seashore). For example, if the statewide take exposure limit in 2016 was set at 35 exposures based on statewide population size in the previous three year period, then the DFW would adjust the number of take exposure allowances available to plan participants to 33 to account for the individual ITP issued to the Town of Orleans that would allow escorted vehicle use in the vicinity of two piping plover broods. This Plan commitment is contingent on the FWS using methods for determining the number of nests, broods, or territories affected by a given activity that are substantially the same as the methods presented in this Plan. In addition, for the DFW to subtract take authorizations from the statewide take limits available to plan participants in a given calendar year, the FWS must notify the DFW in writing by December 31 of the prior calendar

year of the number of take authorizations the FWS has formally authorized for the beach season in question pursuant to individual ITPs or Section 7 consultations.

As described in Section 3.2 above, the primary potential impact associated with this Plan is chick and egg mortality. As such, the Plan limits the number of **nests** (eggs) or **broods** (chicks) that may be exposed to covered activities and potential take.[19] Nests generally contain 4 eggs, although fewer eggs are possible due to smaller clutch size or partial clutch loss from a variety of factors. Broods typically contain 1–4 chicks, depending on hatch rates, predation, and other factors.

Unlike other covered activity scenarios, *Recreation and Beach Operations Associated with Reduced Proactive Symbolic Fencing of Piping Plover Habitat* alters the behavior and habitat use of breeding adults in ways that could reduce nesting and fledging success, in addition to potentially resulting in direct destruction of scrapes and possible increased disturbance of chicks. Therefore, this Plan also limits the number of piping plover **breeding territories** that may be exposed to take.

In order to determine the number of territories affected at a given site, each plan participant will calculate the area of suitable nesting habitat subject to proactive fencing, as well as the density of breeding pairs in this portion of the site and the site as a whole during the prior three years. The DFW will then determine the number of territories affected by using the highest observed density for the site or the affected portion of the site (whichever is higher) for the three-year period. If this calculation is a fraction, the number of territories affected will always be rounded up. Thus, even if a small fraction of a territory is affected, the Plan assumes an impact on the entire territory. The Plan allocates take exposure allowances to plan participants in three year periods (see Chapter 5). Therefore, calculations of territories impacted over time will be adjusted in response to changes in breeding density over time.

The take exposure limits in the last column of Table 3-1 are cumulative. In other words, the respective numbers of nests, broods, or territories exposed to potential take would depend on which covered activities the plan participants request to implement, but the total number of take exposures would not exceed the values in this column.

3.3.2.2 Estimates of Take

In Table 3-1 above, the limits on take exposure were established by setting limits on the number of breeding pairs (nests, broods, territories) to be exposed to covered activities. This section converts those exposure limits to estimates of take expressed as potential number of fledglings taken. This approach is possible because if an activity results in a direct impact such as loss of a nest or mortality of unfledged chicks, this will reduce the number of fledglings ultimately produced by a given breeding pair (see Figure 3-1). For the covered activity *Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks*, take is also expressed as a small increase in adult mortality.

Estimates of take associated with HCPs should make use of the best available information and may be quantitative or qualitative. Many of the activities described in this chapter have a potential for take, the direct effect of which has not been rigorously quantified. For example, observations demonstrate that uncontrolled or loosely controlled OSV use poses a mortality risk to unfledged piping plover chicks. However, no quantitative data exist that explicitly link exposure, with

[19] Use of roads and parking lots in vicinity of unfledged chicks is also assumed to result in a small increased risk of adult mortality.

incorporation of the required minimization measures, to take. For these activities, this Plan relies on professional judgment and a precautionary approach, which assumes an upper-bound take estimate greater than would realistically be expected. In other words, there is a high degree of confidence that the actual level of take associated with implementation of the covered activities will be lower than this estimate. In addition, a second estimate is provided that is still conservative, but closer to the realistic range that would be expected during Plan implementation.

Take estimates are derived from the number of broods, nests and territories potentially exposed (see Table 3-2). All estimates of take are presented as a reduction in productivity as measured by the percentage of fledglings lost as a result of the covered activities (but see adult mortality section below). Although decreased productivity would have a greater demographic impact in a year when the without-project productivity is at or below the replacement rate, both the losses from covered activities and gains from mitigation (which will occur in the same year) are likely to be similarly affected by the "baseline" (i.e., without-project) productivity rate, thereby canceling each other's effects. As discussed previously, adults and post-fledging juveniles are not expected to experience direct mortality as a result of the covered activities, and any disturbance of adults and post-fledging juveniles that results from the covered activities is not expected to have a significant impact on survivorship of these age classes, with the possible exception of unfledged chicks in roads and parking lots.

Table 3-2. Estimates of Take Associated with Plan Implementation Depending on Statewide Population Size[1]

MA Breeding Population Size Prior 3–year Average	Maximum Broods/Nests/Territories to be Exposed to Potential Take[2]	Fledglings to be Taken; Upper Bound Estimate	Fledglings to be Taken; Realistic Scenario
>655	45 +[2]	3.4%	1.7%
625–655	37–39	3.0%	1.5%
594–624	29–31	2.5%	1.3%
563–593	22–23	2.0%	1.0%
532–562	10–11	1.0%	0.5%
500–531	5	0.5%	0.3%
<500	0	0.0%	0.0%

[1] Estimates assume that, in a given year, covered activities are implemented to the maximum extent allowable under the plan. See also "Adult Mortality" below.

[2] This is 7% of the # breeding pairs for all values >655, rounded down to the nearest whole number. For example if the three-year average population size is 725 pairs, then this value would be 50.

As described in Section 3.2, a number of take mechanisms exist, ranging from vehicle collision to nest abandonment to disturbance of foraging chicks. For the purposes of this HCP, potential take is estimated for all activities and all take mechanisms as the percentage of Massachusetts fledglings estimated to be lost (but see discussion of adult mortality below). Expressing these impacts as a percentage change in fledglings produced is desirable because it does not require assumptions about productivity levels, which are known to fluctuate considerably between years. An example of how to calculate the number of fledglings lost for a given productivity level is provided below.

Take Mechanisms and Reduced Productivity

As described above, some of the covered activities result directly in lost productivity (e.g., chick mortality), while others have indirect effects. Unfledged chick and egg mortality are the primary form of take occurring due to covered activities, mostly as the result of vehicle collision and nest abandonment due to disturbance of nesting adults. Although breeding adults will frequently renest after nest abandonment during the early part of the nesting season, nest abandonment will nevertheless decrease the probability of nesting successfully, thereby reducing average productivity. Similarly, reduction in proactive fencing of nesting habitat could reasonably be expected to decrease the fledging success of affected pairs if they are forced to nest in lower-quality habitat or face greater competition. The fraction of exposed chicks killed as a result of vehicle collisions due to expanded OSV use and beach raking is expected to be reduced because of the requirements to intensively monitor chicks during vehicle passage and to have a pedestrian escort walking in front of vehicles.

Disturbance of foraging chicks resulting from OSV use, in particular, could be disruptive enough to reduce survivorship to fledging or post-fledging recruitment into the adult population, primarily by decreasing growth rate and possibly by increasing susceptibility to predation. The magnitude of these effects is expected to be small, due to the limits on driving hours associated with this covered activity and other impact minimization measures. No attempt was made to specifically quantify sublethal effects on unfledged chicks resulting in decreased postfledging survivorship. However, the take estimates presented here account for any modest effects on postfledging survivorship by using a precautionary upper-bound estimate of the effects of the covered activities on productivity.

Take was estimated by assuming that for every brood, nest, or territory exposed to potential take, the affected breeding pair will experience a reduction in productivity. The upper-bound estimate assumes a 50% reduction in productivity, while the more-realistic estimate assumes a 25% reduction in productivity. For example, using the upper-bound approach, a pair that would have fledged two chicks in a given season is assumed to only fledge one chick as a result of being exposed to a covered activity. Sublethal effects on unfledged chicks are addressed by using the precautionary, upper-bound estimate of effects, which overestimates impacts to broods, nests and territories and thus accounts for sublethal effects to unfledged chicks. While it could be argued that this approach underestimates the effects of reduced proactive symbolic fencing, particularly if the population approaches or exceeds carrying capacity, this is not expected to be a significant concern as discussed in Section 3.2.2.2 above.

Example Calculation— As an illustration of how the percentages of fledglings lost were derived, consider the circumstance where the average population size during the prior 3 year period was 600 breeding pairs. According to Table 3-1, the maximum take exposure would be 5% of breeding pairs, or 30. Thus, assuming plan participants applied to expose the maximum number of allowable broods, nests, and territories to potential take, 30 breeding pairs would be expected to experience a 50% reduction in fledging success, under the upper-bound scenario. If 5% of the breeding population experiences a 50% reduction in fledging success, this results in the loss of 2.5% of the population's fledglings, assuming that pairs exposed to covered activities have an average productivity comparable to the breeding population as a whole, prior to taking into account the impacts of the covered activities.

Thus, if the average productivity of the 600 breeding pair population during the year in question is 1.2 fledglings/pair, the population would be expected to produce 1.2 times 600, or 720 fledglings.

However, under the upper-bound precautionary scenario, 30 pairs exposed to covered activities only produce half as many fledglings, resulting in a loss of 0.6 times 30, or 18 fledglings, which is 2.5% of 720. Under the scenario that the DFW considers more realistic, pairs exposed to the covered activities experience a 25% reduction in fledging success, or a loss of 9 fledglings in this example.

In considering the impacts of this loss, it is important to take into account that the loss of fledglings impacts the population much less than the loss of adults. This is because fledglings have a lower annual survivorship than adults, so a greater proportion of the fledglings that are lost due to covered activities would have died in the absence of those activities due to other causes before the next breeding season as compared to a scenario involving adults. To put the level of these impacts in perspective, following the survivorship assumptions in the population viability analysis (PVA) presented in the Atlantic Coast Piping Plover Recovery Plan (Melvin and Gibbs 1996), we can estimate that 52% of the fledglings lost due to covered activities would have perished due to other causes prior to the following breeding season, whereas this percentage would be only 26% if the Plan permitted taking of adults.

Furthermore, it is important to consider that the Plan does not result in any permanent habitat loss, and any short-term impacts on habitat are expected to be both less than significant, due to the impact minimization measures described in Section 3.2, C*overed Activities*, and reversed through natural processes by the beginning of the next breeding season.

Adult Mortality

Covered activities are not expected to result in increased risk of adult mortality with the possible exception of a small increase in risk associated with adults tending unfledged chicks crossing roads or parking lots. In addition to the take estimate presented in Table 3-2 the Plan assumes a 5% risk of adult mortality associated with each incidence of this covered activity. The implications of this assumption on the amount of mitigation proposed and the net effects analysis are discussed in Chapters 4 and 5 of the Plan.

3.3.3 Cumulative Effects

Some activities and projects that are outside the scope of this Plan may nonetheless contribute to cumulative impacts on piping plovers. An analysis of cumulative effects is not required in an HCP; however, an analysis is included here to support the federal biological opinion that will be completed as part of the FWS' internal Section 7 consultation (see Chapter 1 for details). The scope of the cumulative analysis in a biological opinion is limited to nonfederal actions because federal actions (i.e., any federal project, project with federal funding, or project that requires a federal permit) will be the subject of future Section 7 consultations in which cumulative impacts can be considered more fully. To support this analysis, the cumulative projects and activities evaluated in this section are limited to nonfederal projects and activities that are not covered by the Plan. The NEPA and MESA) analysis for this HCP will present a thorough analysis of the cumulative effects of all projects, federal and nonfederal, when combined with the effects of the Plan.

3.3.3.1 Ongoing and Routine Beach Recreation

As described in Chapter 2, a wide variety of recreational activities occur routinely on Massachusetts's beaches. Although virtually all major recreational beaches are managed in general accordance with the State Guidelines, recreational beach use activities not covered by the Plan still

have the potential to impact piping plovers and their habitats. For example, unlawful activities such as speeding or violating pet leash ordinances can result in direct take of plovers, and there have been rare incidences of nest vandalism. At some sites, particularly small private or semi-private beaches, management may not be consistent with the State Guidelines and disturbance or direct take may occur due to recreational activities. Although the DFW considers the risk associated with management in accordance with the State Guidelines to be *de minimis*, activities such as OSV use prior to nest hatching and intensive pedestrian activity still have some potential to impact piping plovers and their habitats. Although the effects are believed to be small, the precise impacts of ongoing and routine beach recreation are unknown.

3.3.3.2 Other Recreational Activities

As described in Chapter 2, emerging recreational activities, such as fat tire biking and kite-surfing have the potential to impact piping plovers and their habitats. Other activities not covered under this Plan, such as fireworks, could impact piping plovers under certain conditions. The DFW has jurisdiction over these and other activities pursuant to MESA and can impose conditions to avoid take, if deemed necessary, or require a CMP if take cannot be avoided (see Chapter). Any recreational activity resulting in take and not covered by this Plan would require an individual HCP and ITP.

3.3.3.3 Shoreline Stabilization and Beach Nourishment

Property owners and beach managers deploy a variety of measures in to mitigate storm damage and beach erosion. Such activities include beach nourishment, artificial dune building, and construction of hardened and semi-hardened structures such as seawalls, coir envelopes, or sand drift fencing. These projects have the potential to destroy or degrade piping plover nesting habitat. However, carefully designed beach nourishment projects also have the potential to be beneficial if they can be implemented outside of major overwash areas, so as to preserve nesting habitat, while reducing the short-term risk of nest loss due to storm overwash. Beach stabilization and nourishment projects have a federal nexus and are therefore addressed through Section 7 consultations. The DFW reviews large and small scale projects pursuant to MESA, and has developed standard conditions for avoiding take when implementing beach nourishment projects (e.g., slope requirements and time of year restrictions). The U.S. Army Corps of Engineers (ACOE) has adopted similar standards that are generally applied to such projects with ACOE involvement. Nonfederal projects resulting in a take—for example, significant dune-building in prime nesting habitat—would require a CMP and individual ITP. At the present time, there are few large scale projects being proposed, those this could change as a result of increased coastal erosion, sea level rise, and climate change.

Chapter 4
Conservation Strategy

4.1 Introduction

The Conservation Strategy for this HCP is designed to meet the requirements of the ESA and MESA, which have different regulatory standards for minimization and mitigation. For the ESA, this Conservation Strategy must minimize and mitigate the impacts of the taking to the maximum extent practicable. To satisfy MESA, the Conservation Strategy must ensure that a "net benefit" is provided to the Massachusetts population of piping plovers (321 CMR 10.23). The Conservation Strategy in this Plan is based on the best scientific data available and stems from the biological goal and objectives developed for the Plan and described below. The DFW and plan participants will implement the conservation actions described in this chapter to achieve the biological goal and objectives of this Plan.

The Plan will contribute to maintaining a viable and robust population of piping plovers in Massachusetts by implementing conservation actions to avoid and minimize take at participating beaches, and by implementing further conservation actions to mitigate unavoidable take. The conservation actions described in this chapter include selective predator management, education and outreach, increased law enforcement, and nesting habitat improvements. These actions will benefit piping plovers and more than offset impacts associated with the covered activities. Note that the minimization actions have been built into the covered activities are described in Chapter 3. Conservation actions will be taken by the DFW in partnership with plan participants and other interested landowners. Finally, this chapter describes the monitoring and adaptive management program that will ensure permit compliance, evaluate the effectiveness of the Conservation Strategy, facilitate refinements and improvements to the strategy over time, and ensure that the biological goal and objectives of the Plan are being met.

4.2 Biological Goals and Objectives

Biological goals for covered species are required by the FWS's *5-Point Policy* to be included in HCPs (65 FR 35242, June 1, 2000). Biological goals are broad, guiding principles for the operating conservation program of the Plan. Biological objectives can be described as a condition to be met or as a change to be achieved relative to the existing conditions. Objectives are measurable and quantitative when possible; they clearly state a desired result and will collectively achieve the biological goals.

This Plan has a single biological goal: **To contribute to the maintenance of a viable and robust population of the piping plover in Massachusetts**.[20] Although many factors affecting the piping plover population in Massachusetts are beyond the DFW and the plan participants' control, the Plan *contributes* to this goal by implementing the take avoidance and minimization measures described in Chapter 3, as well as the specific conservation actions designed to increase piping plover

[20] Viable and robust means able to persist near current population size or higher for the long term.

productivity. The biological goal, objectives, and conservation actions were developed by the DFW in consultation with the FWS and technical experts, as well as stakeholders representing a variety of interests (see Chapter 1). The biological goal and objectives are presented in Table 4-1; this table also lists the corresponding conservation and monitoring actions for each biological objective. Note that the DFW is not proposing to quantify the benefits of Conservation Actions 4 and 5; as such, these activities and their associated objectives do not contribute to the take offset described in Section 4.3.3. Nonetheless, these conservation actions and associated objectives are described here because plan participants will be required to carry out these actions to further benefit piping plovers and contribute to MESA compliance.

Table 4-1. Biological Goal and Objectives

Biological Goal and Objectives	Conservation Actions	Monitoring Actions
Goal 1: Contribute to the maintenance of a viable, robust population of the piping plover in Massachusetts.		
Objective 1. Avoid and minimize take of piping plovers at beaches managed by plan participants.	**Conservation Action 1.** Implement site-specific impact avoidance and minimization plans at participating beaches that are consistent with the Guidelines.[1]	Monitor adherence to the impact avoidance and minimization plan and Guidelines through work logs and record keeping, annual reporting, and DFW compliance site visits.
	Conservation Action 2. Implement impact minimization measures associated with the covered activities as described in the Plan.	Monitor adherence to this Plan through work logs and record keeping, reporting to the DFW during covered activity implementation, and DFW compliance site visits.
Objective 2. Increase nest and fledging success at beaches where mitigation measures are implemented in order to achieve or maintain an average productivity increase ≥20%.	**Conservation Action 3.** Conduct selective predator management[2] to reduce predation and benefit a minimum of 2.5 pairs[3, 4] of piping plovers for every pair (nest, brood, or territory) exposed to covered activities.	Monitor predation and fledging rates[5] pre- and post-implementation and compare to reference sites with no predator management.
Objective 3. Increase awareness of and compliance with the Guidelines and other existing conservation actions to protect piping plovers including pet rules, symbolic fencing, and selective predator management.	**Conservation Action 4.** Conduct education and outreach, increased law enforcement, or both, at sites where such actions are likely to be beneficial.	Monitor frequency of rule infractions and enforcement actions.
Objective 4. Conduct experimental vegetation control to improve nesting habitat and potentially reduce competition and human disturbance.	**Conservation Action 5.** Implement a minimum of two vegetation management nesting enhancement projects during the first 5 years of plan implementation (see Section 4.4.2 on Adaptive Management).	Monitor pre- and post-implementation changes in habitat use and productivity and fledging rates.

1 With the exception of Plan-authorized covered activities.

2 Or other mitigation measures derived from the adaptive management program, e.g., predator exclosures (see Section 4.4.2).

3 See Section 4.3.2.1 below.

4 Additional predator management to benefit 0.5 breeding pairs will be implemented for each instance of the covered activity *Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks*.

5 See Section 4.4.1.2, *Effectiveness Monitoring* below.

4.3 Conservation Actions

4.3.1 Conservation Actions 1 and 2: *Avoidance and Minimization Measures*

Avoidance and minimization measures (Conservation Actions 1 and 2) are an important part of piping plover conservation and this Plan. The Plan contains provisions to ensure that plan participants implement measures to minimize the risk of take when carrying out covered activities (see discussion in Chapter 3) and avoid potential take associated with other non-covered activities by managing sites in accordance with the Guidelines (see Chapter 2). Avoidance and minimization measures are built in to many of the covered activities, as described in Chapter 3, and are summarized in Table 4-2 below. Chapter 5 describes the requirement for each plan participant to develop and implement a site-specific IAMP based on the Guidelines and the impact minimization measures described in this Plan.

Table 4-2. Covered Activities and Key Elements of the Conditions on Covered Activities. See text for additional information

Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks. 1. Barriers. 2. Signage. 3. Staff training. 4. Managing traffic and chicks when chicks are in road or parking lot. 5. Chick monitoring.
Recreation Management and Beach Operations.
Recreation and Beach Operations Associated with Reduced Symbolic Fencing Around Nests. 1. Extent of proposed fencing reduction should be minimized to the extent practical. 2. Fencing should be gradually reduced with monitoring to reduce abandonment risk.
Recreation and Beach Operations Associated with Reduced Proactive Symbolic Fencing of Piping Plover Habitat. 1. Limit activity to <10% of suitable nesting habitat at a site or 2 acres, whichever is less.[1] 2. If piping plovers nest despite lack of fencing, install symbolic fencing around nest. 3. No more than 15% of breeding pairs at a given site exposed. 4. Beach raking permitted in unfenced areas subject to various conditions.
Recreation and Beach Operations at Piping Plover Nest Sites with Nest Moving. 1. Plan participant must demonstrate significant hardship if nest is not moved. 2. Nests will not be moved until at least 48 hours after the clutch is completed. 3. Move nest during favorable weather at appropriate time of day. 4. Suitable relocation site / minimize distance moved.[2] 5. Move nest gradually with monitoring to reduce abandonment risk.
OSV Use in the Vicinity of Unfledged Piping Plover Chicks. 1. Narrow travel corridor with no parking near chicks. 2. Travel restricted to 6 hours/day; at preset times of day. 3. Intensive monitoring of chicks during vehicle passage. 4. Escort of vehicle(s). 5. Staff training, enforcement, and communication protocols. 6. Mandatory OSV operator education. 7. Vehicle ruts will be smoothed out at least once/day when young chicks are present.
[1] This limit may be exceeded, subject to other limitations, at a limited number of sites. (Section 5.2.2.3)

[2] Relocation site selection will avoid encroaching on territories of other breeding pairs.

4.3.2 Conservation Actions 3–5: *Mitigation Measures*

The mitigation strategy in this Plan is intended to offset the unavoidable take associated with the covered activities (expressed as fledgling loss, see Section 3.3.2). Based on guidance provided by the FWS duringlan development, the *only* mitigation measure being proposed to fulfill ESA permitting requirements is selective predator management. In addition to selective predator management, a wider array of mitigation strategies, including, but not necessarily limited to the increased law enforcement, education, outreach, and experimental habitat enhancement described in the Plan, can contribute towards meeting MESA permitting requirements. Based on extensive consultation with stakeholders, this Plan is designed to provide an array of mitigation options that can be carried out either onsite by plan participants, or offsite under DFW oversight, with funding provided by plan participants (see Section 5.2, *Plan Implementation*). As further described in Section 5.2, *Plan Implementation*, each plan participant will need to develop an IAMP that also meets MESA permitting standards. Regardless of the details of the IAMPs proposed by individual plan participants and approved by the DFW to ensure MESA compliance, this Plan commits the DFW to ensure that, on an annual basis, sufficient selective predator management will be carried out to offset the take associated with implementation of that year's covered activities (i.e., a 2.5:1 or 3:1 mitigation ratio, see Table 4-1, *Conservation Action 3*).[21] To the extent that the DFW approves mitigation plans (see Chapter 5) from some plan participants that do not include selective predator management or funding for same in any given year, the DFW will not authorize covered activities in excess of those mitigated through selective predator management on a statewide basis. Currently the DFW anticipates sufficient funding will be collected through COIs that are paying into the predator mitigation fund or implementing predator management on-site. Otherwise, the number of plan participants and or take authorizations will be reduced if insufficient funds or sites are available to fulfill mitigation requirements.

The proposed mitigation approach closely mirrors the "Enhanced Management Program" developed and approved by federal and state natural resource trustees to restore piping plovers affected by the oil spill from Bouchard Barge 120 in Buzzards Bay (FWS et al. 2012). Based on literature reviews, expert testimony of FWS technical experts, and careful consideration of alternatives, the Bouchard restoration trustees determined that a restoration strategy combining selective predator management, increased law enforcement, and education and outreach was the most effective strategy to mitigate oil spill impacts on the piping plover population. Biological Objectives 2 and 3 in this Plan and their associated conservation actions follow this approach (see Table 4-1).

The Bouchard trustees determined that the three-part Enhanced Management Program would result in an estimated 20% increase in piping plover productivity for each pair benefiting from the program. Because the benefits of increased law enforcement and education and outreach are difficult to quantify, the trustees estimation of potential benefits rests heavily on a comparison of site productivity between years where predator management was employed and those years when

[21] As further described in Section 5.2, this will be achieved by plan participants implementing selective predator management on their own properties, or through DFW oversight of implementation at other suitable sites by willing landowners. As shown in Table 5-5, funding provided by plan participants will likely be the primary mechanism to fund offsite selective predator management overseen by the DFW. However, the DFW and the plan participants may elect to pursue other funding sources for selective predator management (e.g., grants).

it was not. In particular, the Final Restoration Plan reports on three New England sites where productivity rose by 24, 108, and 198%, respectively, comparing years with predator management to years without. The Final Restoration Plan also references other reports showing no gain in productivity associated with predator management at some sites in some years; however, it was determined that, on average, predator control can be relied upon to increase productivity by 20% or more across sites and years. Additional information on the benefits of selective predator management is provided below (see Section 4.3.2.1).

Although the benefits of increased law enforcement and education and outreach are difficult to quantify, the DFW agrees with the conclusions of the FWS and the trustees that an integrated three-part Enhanced Management Program will be effective at increasing piping plover productivity. Therefore the mitigation proposed in the Plan is nearly identical to the Enhanced Management Program associated with the oil spill, with the exception that the amount of funding available for conservation actions to benefit each breeding pair will be greater for the Plan than for the oil spill mitigation (see Chapter 5). In addition, the Plan proposes nesting habitat improvement projects not included in the oil spill piping plover restoration (see Objective 4 and Conservation Action 5 in Table 4-1). The DFW is committed to working with plan participants and other stakeholders to implement a multifaceted mitigation strategy and plans to commit significant resources to conservation actions other than selective predator management (see Sections 5.2 and 5.4). However, as explained above, information about mitigation measures other than selective predator management is being provided to the FWS for informational purposes only. This information is included in the Plan to describe the full conservation benefits of Plan implementation, and to aid potential plan participants in developing COI applications that achieve MESA compliance.

4.3.2.1 Conservation Action 3. Selective Predator Management

High egg and chick predation resulting in low reproduction (i.e., low productivity) is one of the largest threats currently facing piping plovers in Massachusetts (see Chapter 2). Predation rates vary significantly among sites, with some sites experiencing severe predation pressure leading to reproductive output far lower than the ±1.2 fledglings/pair needed to maintain a stable population size based on demographic data and survival analysis (Melvin and Gibbs 1996; Hecht and Melvin 2009). In recent years, average statewide productivity has often failed to meet this threshold, raising the potential for population decline if management action is not taken.

Effective predator management programs are highly selective, focusing exclusively on sites with documented high predation and low productivity. These programs should include elements to minimize the factors that attract common predators to beach sites (e.g., ensuring that trash and food is carried off of beaches). They should then focus management on specific predators documented to be actively targeting plovers or their nests. As further discussed below, recent experience with selective predator management in Massachusetts and adjacent states indicates that it can be a successful approach to significantly increase piping plover productivity (FWS et al. 2012; see also Section 4.3.3).

As further described in Chapter 5, each fall, the DFW will determine the number of annual take exposure allowances authorized under this Plan for the following beach season, based on a rolling three-year average of the plover population size (see Chapter 3). The allowable level of take will determine how much take can be annually allocated to each of the approved COI participants for conducting covered activities and also the level of predator management required for mitigation. Predator management will be designed to benefit 2.5 breeding pairs for every brood, nest, or

territory exposed to take from covered activities. Selective predator management to benefit an additional 0.5 breeding pairs will be implemented for each instance of the *Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks* covered activity. As shown in Table 4-6, this mitigation ratio is adequate to more than offset the proposed take exposure even under the most conservative estimates presented, based on the best scientific evidence available. The DFW anticipates that even under conservative assumptions, an extra 1.25 – 3.5 fledglings will be produced by the mitigation for each fledgling lost from covered activities. Predator management will be implemented at sites that support adequate numbers of breeding pairs to achieve this mitigation ratio, based on the prior season's count of breeding pairs. A recount of the number of breeding pairs will be conducted in the breeding season concurrent with predator management to ensure that a sufficient number of breeding pairs are present and thus "receiving" the benefit. If population declines result in fewer plovers and the required mitigation ratio is not met, additional predator management will be implemented during the following season to make up for the deficit (see Chapter 5). However, this is anticipated to be an unlikely scenario because slightly more than the minimum required predator management will be implemented where possible to account for this uncertainty. Any extra mitigation can be credited to the following season, if not needed to mitigate for covered activities in a given season (see Chapter 5).

Plan participants may elect to implement selective predator control directly on piping plover breeding sites under their control (on-site), or to provide funding for predator management to be administered by the DFW (off-site). Note that plan participants may elect other mitigation options (see Chapter 5). However, in the case of on-site predator management the plan participant is required to develop a "mitigation plan" that details the site-specific predator management that will be implemented. Required components of the plan are described in Section 5.2.2.3. Plan participants are encouraged to follow the steps provided in Table 4.3 for "Development of Site-Specific Predator Management Plans" and "Implementation." This needs to be submitted as part of the mitigation plan for approval by DFW as part of the COI application process. Additional details and requirements are provided in Chapter 5.

In the case of off-site predator management (i.e. mitigation), plan participants will provide funding to DFW and DFW will be responsible for implementing the selective predator management (Section 5.2.2.3). As explained in Section 5.2.2.3, the mitigation plan should explain that this is the plan participant's selected method for achieving mitigation, the amount of mitigation that will be required for DFW to achieve, and how much funding is being provided annually. Thereafter, it will be DFW's responsibility under this Plan to implement a selective predator management program that will sufficiently offset the take incurred by the plan participant. A summary of DFW's process for selecting sites for selective predator management, developing and implementing sites specific budgets and work plans is provided in Table 4 3. Details about required effectiveness monitoring and adaptive management to improve selective predator management techniques are provided in Sections 4.4.1.2 and 4.4.2.

DFW's selective predator management program will be performed in accordance with site-specific selective predator management plans containing detailed information about implementation and monitoring. These selective predator management plans will be prepared by DFW-approved predator management experts with a proven track record managing beach predators, and each plan will be approved by the DFW and the FWS in advance of implementation. The plans will reflect how DFW is directing the funds, selection of appropriate sites, and specify the level of effort required to achieve the required level of mitigation. Work will be carried out by qualified predator management experts at suitable breeding sites with documented high rates of predation, as approved by the DFW

and the FWS. Suitable sites may include plan participant-owned properties, or other suitable properties with landowners interested in participating in this program to benefit piping plovers. In the latter case, plan participants will provide the required funding, and the DFW will secure the required contractor and landowner permission. The DFW and plan participants may elect to implement more than the minimum predator management required. Any predator management beyond that required to offset take in a given year may carry over for up to three subsequent years as described in Chapter 5 (see Section 5.2.2.1).

Following the approach of the Bouchard Restoration Plan, a suite of predator management techniques will be deployed as described in Vashon (2008), National Park Service (2007), and USDA-APHIS (2011). As described above, site-specific selective predator management plans will be prepared to focus management on the most problematic predator species and/or individuals (FWS et. al. 2012). One management approach is to selectively remove individual predators, particularly those predators that have become focused on plover nests, chicks, or adults. Predator removal efforts will use approved lethal techniques for wildlife damage management (USDA-APHIS 2003, USDA-APHIS 2004, USDA-APHIS 2011). Massachusetts law (MGL c.131 Section 80A: Regulations 321 CMR 2.08) requires that trapping of mammalian predators (e.g., raccoons, opossums, and skunks) be limited to cage- or box-type traps. All traps used to capture mammals will meet the existing *Best Management Practices for Trapping* (Association of Fish and Wildlife Agencies 2006). Massachusetts does not permit mammalian predator relocation; therefore, mammalian predators will be humanely euthanized. In addition to trapping, nocturnal mammalian predators such as coyote and fox will be located at night using spotlights or thermal imaging equipment and then shot with suppressed rifles or shotguns (USDA-APHIS 2011). Avian predators will also be removed, using firearms employing a silencing device. Toxicants may also be used to remove crows. If feral cats are among the identified predators, cat control will be coordinated with local animal shelters. All cats that are captured live as part of the proposed program will either be returned to the cat's owner (if proper identification can be determined), or taken to an animal shelter for health evaluation and, if possible, adoption. The final disposition of a feral cat would be determined by the animal shelter.[22]

Selective predator management will be implemented during late winter and spring and may continue into the summer. When applicable, an initial predator removal effort will be implemented prior to nest establishment, in late winter and spring, by USDA–Wildlife Services or other qualified personnel with a demonstrated track record of successful predator management. A second phase of predator removal may be implemented during the plover egg-laying period (i.e., from late April into June), if determined to be necessary based on levels of predator activity, and the removal activity does not adversely affect plovers.[23] Monitoring for predator presence will be completed following the predator removal efforts to identify any predators that may still be present.

Selective predator management will seek to avoid capturing or killing predators that are not targeting piping plovers. Such selective removal efforts will have short-lived and highly localized effects on predator populations (USDA-APHIS 2011). Benefits to piping plovers will also be relatively short-lived; thus, a multi-year removal program will be most effective at each target site.

[22] Cats without identifiable owners may be fitted with passive integrated transponders (PIT tags) pending consultation with the shelter. Pet owners routinely have PIT tags inserted in their pets to aid in identifying lost animals.

[23] Contracts for selective predator management executed in advance of the piping plover breeding season will automatically include funding for this late season management to ensure implementation where needed.

Any predator removal efforts will only be conducted with permission from the landowner and with appropriate local, state, and federal permits. The majority of predator removal activities are typically implemented at times of the year (late winter and early spring) and times of the day (evening) when human use of the beaches is already greatly reduced or absent. As a result, beach closures are not usually necessary during implementation (FWS et al. 2012).

Recent selective predator management efforts in Massachusetts using these techniques have proven to significantly increase piping plover productivity. The DFW analyzed data from 11 sites with at least one season of selective predator management performed by the U.S. Department of Agriculture Animal and Plant Health Inspective Service (USDA-APHIS) (MA DFW unpublished). Of these 11 sites, 4 sites had 5 or more years of predator management. Considering all 11 sites, average productivity in the years with predator management was 84% higher than average productivity in the 2 years prior to implementation of predator management. Considering only the 4 sites where predator management was implemented for 5 or more years, productivity averaged 67% higher in years with selective predator management as compared to the 2 years prior to management. As described in Chapter 2, statewide piping plover productivity can vary significantly from year to year. If productivity increased from one year to the next at all sites monitored, then this could lead to an overestimate of the benefit of selective predator management. This is because a portion of the observed increase in productivity might be due to factors other than predator management. Considering the 4 sites with 5 or more years of predator management, the adjusted increase in productivity in years with predator management is 57.0%, after controlling for background changes in productivity. This result suggests that predator management can be highly effective at increasing productivity, but it must be applied regularly to produce long-term population gains.

It is expected that this conservation action alone will be sufficient to meet the mitigation requirements of this Plan to increase piping plover productivity. However, Conservation Actions 2 and 3 are also important elements of the Plan and will complement predator management efforts, even if the benefits of these actions are more difficult to quantify.

Table 4-3. Summary of Selective Predator Management Site Selection and Implementation. [1]

Site Selection
1. Identify site with high predation rates resulting in low productivity (<1 fledgling/pair)[2,3]
2. Landowner willing to implement predator management
3. Preference for sites with relatively high abundance densities (i.e., >5 plover pairs)
4. Identifiable predators that are feasible to manage ("implementable")
Development of Site-Specific Predator Management Plans
1. Qualified predator management expert with a proven track record of implementing selective predator management on beaches with nesting piping plovers ("Expert") consults with the DFW and the beach manager and conducts a site visit, if necessary.
2. Expert develops detailed site specific annual work plan describing predator species to be targeted, methods, anticipated level of effort, cost, and required reporting.
3. Site-specific selective predator management plans will be modeled on the 2013 and 2014-2015 Scopes of Service that are Attachments A of the USFWS/USDA Interagency Agreements entitled "Predator Control for Piping Plover Restoration" (Bouchard Scopes). Although the site specific levels of effort and costs will vary based on site characteristics, accessibility, and other factors, the level of effort and costs are anticipated to be in the range of the Bouchard Scopes adjusted for inflation over time.[4]
4. The DFW, in consultation with the FWS, approves the site-specific work plan and budget.
Implementation
1. Expert implements selective predator management in late winter or early spring, extending into the plover breeding season, as necessary.
2. Expert consults with the DFW and plan participant(s)[5] during implementation, and work plan is adjusted and improved as practical to address unanticipated issues.

[1] This table applies to predator management implemented by plan participants ("onsite") as well as under direct DFW supervision, at other sites ("offsite"). See Section 5.2.

[2] The DFW reserves the right to include sites with productivity >1 as long as the benchmark of ≥20% increase in productivity can be met on a statewide basis.

[3] Baseline conditions for the purposes of identifying suitable sites and the efficacy of predator management will be defined as the average (unweighted) onsite productivity in the two breeding seasons prior to implementing selective predator management. The DFW may also provide information about a longer four year baseline period, particularly if high between year variation in productivity is observed at baseline. Sites with ongoing selective predator management may participate provided that the DFW evaluates the baseline productivity rates at such sites prior to predator management.

[4] A review of the Bouchard Scopes of Work indicates 2013–2015 predator management costs in the range of $500–1,500 per piping plover pair, sometimes less. This Plan assumes a cost of $1,600 per pair (see Chapter 5)

[5] If predator management is occurring on a plan participant's property, that plan participant would be consulted.

4.3.2.2 Conservation Action 4. Education, Outreach, and Increased Law Enforcement

The benefits of this conservation action are not factored into the net effects analysis presented in the Plan, and as such do not formally contribute to the mitigation required to offset potential take associated with the covered activities. Implementation of this conservation action by plan participants may contribute to achieving MESA compliance. As described in FWS et al. 2012, the purpose of education and outreach is to increase community support for measures to protect and manage piping plovers. Some sites may benefit from outreach directed specifically to pet owners, OSV operators, or other groups of beach users. Outreach efforts may include targeted programs, informational signs, or printed materials. Increased law enforcement may include extra patrols and

other enforcement operations during the piping plover breeding season. The purpose of increased law enforcement is to reduce the risk of disturbance, harassment, or mortality of piping plovers resulting from off-leash dogs or other illegal recreational activities. Despite existing restrictions, monitoring, and enforcement, complex patterns of land ownership and beach use result in enforcement gaps. Supplementing existing law enforcement efforts will benefit piping plovers at some sites. As described in Chapter 5, education, outreach, and increased law enforcement efforts will be carried out by plan participants at sites they manage and may also be carried out at supplemental sites. Beach managers interested in developing and implementing these conservation actions will develop a written work plan and budget. All site-specific education, outreach, and increased law enforcement plans will be subject to advance review and approval by the DFW.

4.3.2.3 Conservation Action 5. Nesting Habitat Improvement

The benefits of this conservation action are also not factored into the net effects analysis presented in the Plan, and as such do not formally contribute to the mitigation required to offset potential take associated with the covered activities. Implementation of this conservation action by plan participants may contribute to achieving MESA compliance. During meetings with stakeholders, some beach managers suggested that, at some sites, vegetation management has the potential to provide significant benefits to piping plovers. For example, at some sites, plant growth and succession has rendered formerly suitable nesting areas unsuitable. Managing vegetation in appropriate areas would benefit breeding plovers by increasing the availability of suitable habitat and decreasing competition. As a result, a pilot habitat management project will be carried out on at least 2 sites within the first 5 years of the permit term, and up to 5 sites over the 25-year permit term in accordance with all applicable federal, state, and local laws, including the standards outlined in the Massachusetts Wetlands Protection Act. These pilot projects will be limited in scope to no more than 0.5 acres per project and 2.5 acres total and will mimic natural disturbance processes such as storm overwash.

Because nesting habitat improvement through vegetation management has rarely been implemented on Massachusetts beaches, there is uncertainty as to its effectiveness and duration. This uncertainty will be addressed through pre- and post-implementation monitoring of vegetation and piping plover habitat use (Table 4-8).[24]

4.3.3 Benefits and Net Effects of the Proposed Mitigation

In summary, the DFW and plan participants will implement a selective predator management program that will benefit at least 2.5 breeding pairs of piping plover for every pair (clutch, chicks, or territory) exposed to covered activities.[25] In addition, increased education and outreach, and increased law enforcement will be implemented to benefit plovers, as well as several experimental vegetation control projects to improve nesting habitat. As described above, this package of conservation actions was designed to follow the approach described in the Bouchard Restoration Plan. The oil spill trustees concluded that these actions would result in a 20% increase in piping

[24] The DFW believes there is a sufficient scientific basis to justify experimental vegetation management as a mitigation measure for the purposes of complying with MESA.

[25] Selective predator management to benefit an additional 0.5 breeding pairs will be implemented for each instance of the *Use of Roads and Parking Lots in the Vicinity of Unfledged Chicks* covered activity

plover productivity for each pair benefiting from the program.[26] The data on the benefits of predator management in Massachusetts presented in Section 4.3.2.2 indicate that selective predator management is expected to produce substantially more of an increase in productivity than 20% (e.g., the 4 sites studied for more than 5 years produced a 57% increase). Conservation Actions 2 and 3 are expected to increase piping plover productivity even further.

The Plan's net effect on piping plovers is summarized in Table 4-4 and Table 4-5. The calculations in these tables follow the same approach used to estimate impacts from covered activities (see Chapter 3). Table 4-4 presents worst-case-scenario assumptions of the impact and benefit of plan activities. Under this scenario, a 50% decrease in productivity is projected for each allowed take exposure and only a 25% increase in fledging success for each pair benefiting from the mitigation. The Conservation Strategy in this Plan requires that mitigation be implemented for 2.5 pairs for every clutch, brood, or territory exposed to the covered activities. Similarly, the realistic scenario (Table 4-5) assumes a 25% reduction in productivity for each allowed take exposure and a 35% increase in productivity from mitigation. Table 4-4 and Table 4-5 demonstrate that, under both scenarios, the expected increase in productivity from the conservation actions exceeds the expected decrease in productivity from the covered activities. Therefore, implementation of this Plan is expected to result in a net increase in productivity, or the number of fledglings produced, on a statewide basis. This can also be expressed as the production of 1.25 – 3.5 additional fledglings through the selective predator management portion of the mitigation program for every fledgling lost through the implementation of the covered activities.[27]

Table 4-4. Annual Estimated Effects on Fledglings Using Worst-Case-Scenario Assumptions (productivity decrease of 50% for fledglings exposed to take, productivity increase of 25% for fledglings from mitigation)

MA Breeding Population Size[1]	Effects of Covered Activities	Effects of Mitigation	Net Effects
	Decrease **in Fledgling**	***Increase*** **in Fledglings**	***Increase*** **in Fledglings**
>655	3.5%	4.3%	0.9%
625–655	3.0%	3.7%	0.7%
594–624	2.5%	3.1%	0.6%
563–593	2.0%	2.4%	0.5%
532–562	1.0%	1.2%	0.2%
500–531	0.5%	0.6%	0.1%

[1] Prior 3-Year Average

[26] The Bouchard quantification of benefits relies heavily on selective predator management, because benefits of the other conservation actions are difficult to quantify.

[27] Although the Plan presents the worst-case-scenario for the purpose of this HCP, the DFW considers this scenario to be unnecessarily conservative for the purpose of MESA implementation.

Table 4-5. Annual Estimated Effects on Fledglings Using Realistic Assumptions (productivity decrease of 25% for fledglings exposed to take, productivity increase of 35% for fledglings from mitigation)

MA Breeding Population Size[1]	Effects of Covered Activities	Effects of Mitigation	Net Effects
	***Decrease* in Fledglings**	***Increase* in Fledglings**	***Increase* in Fledglings**
>655	1.8%	5.1%	≥4.3%
625–655	1.5%	4.4%	3.7%
594–624	1.3%	3.7%	3.1%
563–593	1.0%	2.9%	2.4%
532–562	0.5%	1.4%	1.2%
500–531	0.3%	0.7%	0.6%

[1] Prior 3-Year Average

Using a slightly different approach, Table 4-6 presents an analysis of the net effects tied to increased risk in adult mortality associated with the operation of roads and parking lots in the presence of unfledged chicks. As discussed in Chapter 3, in addition to a reduction in fledging success for each brood exposed, this covered activity is assumed to carry a 5% risk of adult mortality for adults tending a brood (one adult will be lost for every 20 instances this covered activity is implemented). To offset this take, the Plan proposes selective predator management to benefit an additional 0.5 pairs of breeding piping plovers for every brood exposed (i.e., mitigation at 3:1 instead of 2.5:1). This results in a net increase of 0.023 adults in the breeding season following implementation per incidence of this covered activity and associated mitigation (Table 4-6). To complete this analysis, the Plan assumes that each breeding pair benefiting from selective predator management experiences an average increase in fledging rate of 0.25 fledglings (approximately 20% of the long-term statewide average of 1.3–1.4 fledglings/pair). Thus, one half pair will produce an extra 0.125 fledglings which is expected to yield 0.125 X 0.48 = 0.06 extra adults the following breeding season based on the 0.48 fledgling annual survivorship estimated in the recovery plan population viability analysis (Melvin and Gibbs 1996). Correspondingly, the loss of 0.05 adults associated with each instance of implementation of this covered activity will result in a loss of 0.05 X 0.78 = 0.037 adults the following breeding season. This results in an estimated net *increase* of 0.06 – 0.037 = 0.023 adults per incidence of this covered activity the following season.

Table 4-6. Estimated Effects on Adults of Each Incidence of the Unfledged Chicks in Roads and Parking Lots Covered Activity and Associated Mitigation. See Text for Methods.

Effects of Covered Activity	Effects of Mitigation	Net Effects
***Decrease* in Number of Adults Subsequent Breeding Season**	***Increase* in Number of Adults Subsequent Breeding Season**	***Increase* in Number of Adults Subsequent Breeding Season**
0.037	0.06	0.023

The factors that regulate piping plover population size are poorly understood, and, as described in the Piping Plover Recovery Plan (FWS 1996), experts have suggested that the Massachusetts piping plover population remains well below carrying capacity (DFW 1996). Furthermore, it has been suggested that density dependent predation on clutches and broods, and not availability of habitat, may limit population size in the closely related snowy plover (*Charadrius novosus*) (Page et al. 1983). Nonetheless, theoretically, if the Massachusetts or New England piping plover population

were at or above carrying capacity, the *Recreation Associated with Reduced Proactive Symbolic Fencing of Piping Plover Habitat* covered activity could slightly reduce potential population size by temporarily reducing the availability of habitat (see Section 3.2.2). Under this hypothetical carrying capacity scenario, selective predator management might not fully offset the take associated with this covered activity.[28] On the other hand, if population size is regulated by other factors such as predation, selective predator management is an excellent strategy to offset the take associated with reduced proactive fencing and the Plan may overestimate the negative effects of this activity. Regardless, this issue is not of significant concern because of the limited scope of the proposed activity both on a statewide and site-specific basis. In many cases, this activity is expected to shift the breeding distribution within a site, rather than displace breeding pairs. In fact, because of relatively low recreational beach use early in the beach season, some breeding pairs may nest successfully even in the absence of symbolic fencing, in which case reduced symbolic fencing will be required and no displacement will have occurred.

4.4 Monitoring and Adaptive Management

This section describes the monitoring and adaptive management program for the Plan. The purpose of monitoring is to ensure compliance with the Plan and to evaluate the effects of the management actions with respect to the biological goal and objectives. Adaptive management and monitoring will be integrated into one cohesive program where monitoring will inform and change management actions to continually improve outcomes for piping plovers.

Adaptive management is a decision-making process promoting flexible management such that actions can be adjusted as uncertainties become better understood or as conditions change. Monitoring the outcomes of management is the foundation of an adaptive approach, and thoughtful monitoring can both advance scientific understanding and modify management actions iteratively (Williams et al. 2007). By regulation, an HCP must incorporate monitoring of conservation measures and the response of covered species to these measures (50 CFR 17.22(b)(1)(iii) and 50 CFR 222.22(b)(5)(iii)). An adaptive management strategy is also a recommended component of HCPs with data gaps that would substantively affect how the species is managed and monitored in the future (65 FR 35251). The FWS and NMFS *Five-Point Policy* (65 FR 35241–35257) describes adaptive management as an integrated method for addressing uncertainty in natural resource management and states that management must be linked to measurable biological goals and monitoring. The monitoring and adaptive management program described in this chapter is intended to fulfill requirements to monitor compliance and species response to management activities under this Plan.

[28] Little is known about how population density in natal areas affects dispersal distances or the prevalence of non-breeding second year birds, which may effectively provide a buffering effect that stabilizes local population size in the event of low recruitment years. Furthermore, significant between year variation in productivity suggests that a population at or near carrying capacity would likely oscillate significantly from year to year. For these reasons, (and possibly others, e.g., detrimental effects of high predation on site-specific breeding densities in subsequent years) selective predator management could still provide significant conservation benefits even if local carrying capacity is reached.

4.4.1 Monitoring

There are two main types of monitoring covered in this section: compliance monitoring and effectiveness monitoring. Specialized monitoring of piping plovers exposed to covered activities to minimize impacts and take is discussed in Section 3.2.

4.4.1.1 Compliance Monitoring

Compliance monitoring tracks the status of Plan implementation and documents that all requirements of the Plan are being met. Compliance monitoring verifies that the plan participants are carrying out the terms of the Plan in accordance with their COI (see Chapter 5) and that the DFW is ensuring compliance with the Plan as a whole. Plan participants will monitor and ensure their own compliance and provide these monitoring results annually to the DFW, although the DFW and the FWS may request copies of the logs at any time during the season. In addition, the DFW will conduct its own compliance monitoring and provide results of both plan participant and DFW compliance tracking and monitoring to the FWS annually (see Table 4-6). In addition to tracking and reporting progress on all implementation tasks in the Plan, IAMPs, and mitigation plans, compliance monitoring may include such things as verifying that broods are monitored at required frequencies, and that required setbacks between OSV's and unfledged chicks are maintained. The overall purpose of compliance monitoring is to ensure DFW and plan participants are adhering to the impact minimization and mitigation measures associated with carrying out covered activities, as well as any other required components of the Plan or ITP.

Annual Statewide Piping Plover Census Report

A key element of this plan is the determination of the statewide breeding population size on an annual basis in order to determine the allowable limit on take exposure for the following beach season (based on the adjusted total count; see Section 3.3.2.1 and Table 3-1). To determine piping plover abundance, distribution, and productivity in Massachusetts on an annual basis, the DFW has a long history of coordinating data collection by beach managers and other cooperators, performing quality control on the data, finalizing the census, and preparing an annual report (e.g., DFW 2012; see Section 2.3.2.8). To facilitate data submission, the DFW quality control process, and data analysis to inform statewide and regional conservation efforts, the DFW worked with MassAudubon in 2015 to develop a new web-based portal and database for piping plover censusing.

Once the Plan is implemented, the DFW will continue to coordinate statewide data collection efforts and perform quality control on the data submitted through the web-portal. Cooperators will submit total counts and index counts to the DFW as well as supporting information about the fate of each piping plover nesting attempt, and maps (for methods, see DFW 2012). The DFW will check for mathematical errors and perform a variety of quality control procedures to minimize error rates and avoid over-counting. For example, the DFW will check the number of active nests and pairs with chicks at a given site during the index count census window, and if this deviates significantly from the index count, consult with the data reporter.[29] As new breeding pairs may arrive at a site during the course of the breeding season, and plover pairs onsite may also renest, the DFW will examine the data to minimize the risk of overcounting pairs, with a particular focus on high density beaches with many piping plover pairs nesting in close proximity. In general, the DFW and data-reporters will

[29] Some deviations are expected due to the presence, for example, of courting pairs.

assume that nesting attempts in the vicinity of previously failed nests are renesting attempts by a resident pair, unless there is good evidence based on factors such as timing, number of adults present, appearance of individual adults, or territorial conflicts that a new pair is present. It is important to note that both the index count and the adjusted total counts are designed to address potential low levels of overcounting that could arise from misclassification of renests as new pairs, or movement of pairs among sites.

The DFW will retain logs that document the quality control process, track all site-specific questions that arise, and track any changes made to the counts during the quality control process (e.g., reclassification of a nesting attempt as a renest versus a new pair, pending consultation with the data reporter). The DFW will produce a publically available annual census report by November 15 of each calendar year, but reserves the right to deviate from this timeline.[30] However, the DFW will always publish the annual report at least 21 days before determining the statewide take allocation under the Plan for the following beach season (see Tables 4-7 and 5-1).

[30] Note that compilation of the census report requires data submission by beach managers and other cooperators throughout the state, many of whom will not be plan participants.

Table 4-7. Compliance Monitoring and Reporting Requirements

Element Tracked	Monitoring Objectives	Plan Participant Actions	DFW Actions	Reporting
Annual limit on statewide take exposure	• Calculate limit based on three-year rolling average of adjusted total count (see Section 4.4.1.1)	• Provide piping plover census data including index and total counts in proper formats with maps.	• Continue to coordinate statewide data collection by cooperators; perform quality control and finalize counts.	• Provide annual report including final statewide total count, index count, and fledging rate by November 15.[1]
Site-specific and statewide numbers of broods/ nests /territories affected	• Do not exceed statewide take exposure limits (see Table 3-2) • Do not exceed site-specific take exposure limits (see Chapter 5)	• Maintain log of initiation date(s) for covered activities; numbers of pairs, broods, nests, and chicks exposed; and locations; make the log available for inspection by the DFW/FWS upon request. Logs should also track monitoring frequency of all onsite breeding pairs and habitat. • Notify the DFW at least 24 hours in advance of initiation of any covered activity and when covered activity ceases.	• At least one site visit and log inspection per year for the first 5 years of Plan implementation; frequency may be reduced in subsequent years.	• Include summary and copy of logs in plan participant annual report to the DFW; due October 15 (see Section 5.2.2.3) • Include summary in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1)
Compliance with the Guidelines (except for covered activities)	• Avoid and minimize impacts/take associated with the implementation of routine recreational beach uses and operations	• Maintain logs to document timing and frequency of activities such as installation of symbolic fencing, monitoring of plover activity, beach patrols, enforcement of ordinances such as leash rules, timely implementation of temporary prohibitions on non-essential vehicle use.	• At least one site visit and log inspection per year for the first 5 years of Plan implementation; frequency may be reduced in subsequent years.	• Include summary and copy of logs in plan participant annual report to the DFW; due October 15 (see Section 5.2.2.3) • Include summary in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1)

Element Tracked	Monitoring Objectives	Plan Participant Actions	DFW Actions	Reporting
Compliance with impact minimization protocols	• Avoid and minimize impacts/take associated with implementation of covered activities (see discussion of conditions on covered activities in Section 3.2)	• Maintain customized, daily, site-specific implementation log as described in the site-specific IAMP approved by the DFW (e.g., to document staffing, frequency of brood monitoring, compliance with OSV escorting procedures). • Notify the DFW at least 24 hours in advance of initiation of any covered activity and when covered activity ceases.	• At least one site visit and log inspection per year for the first 5 years of Plan implementation; frequency may be reduced in subsequent years.	• Include summary and copy of logs in plan participant annual report to the DFW; due October 15 (see Section 5.2.2.3) • Include summary in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1)
Compliance with mitigation requirements	• Ensure that mitigation takes place in advance of or contemporaneously with covered activities • Ensure 2.5:1 mitigation ratio (or 3:1 as applicable, see Section 4.3.2.1) • Maximize productivity benefits associated with mitigation	• Monitor number of breeding pairs and within-site distribution on an annual basis. [2] • Maintain log and invoices to document that the mitigation plan is carried out by qualified personnel in accordance with the DFW-approved site-specific IAMP and budget (see Chapter 5).[3]	• Evaluate site-specific selective predator management plans and reports to ensure quality control of both site selection and implementation • Site visits	• Mitigation implementation reports to the DFW; due October 15 (see Section 5.2.2.3) • Include summary in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1)

[1] Because this involves submission of data from multiple cooperators including parties *not* participating in the Plan, the DFW reserves the right to deviate from this timeline due to circumstances beyond its control, but the annual report will always be made available to the FWS and the public at least 21 days in advance of issuing COI's or COI renewals based on the three-year average adjusted total count derived in part from the report.

[2] As described in Chapter 5, the DFW will administer a grant program or contract with qualified predator management personnel to enable selective predator management at sites in need with interested landowners that are not plan participants. In these cases, monitoring actions will be carried out by grant recipients or DFW contractors rather than plan participants.

[3] As described further in Chapter 5, site-specific IAMPs must be prepared and implemented by technical experts approved by the DFW. Final implementation plan and budget will require advance written approval by the DFW.

FWS = U.S. Fish and Wildlife Service

DFW = Massachusetts Division of Fish & Wildlife

4.4.1.2 Effectiveness Monitoring

Effectiveness monitoring assesses the biological success of the Plan and includes both status and trends monitoring and effects of management monitoring (Atkinson et al. 2004).

Virtually all piping plover breeding pairs in the state are monitored and included in statewide census and productivity estimates (see Chapter 2). The DFW coordinates with cooperators to ensure adequate monitoring coverage, provides standardized census forms, collects, compiles, and verifies the data, organizes the annual cooperators' meeting, provides technical assistance, and publishes an annual piping plover census report. The DFW and its cooperators will continue this effort, which will enable the DFW to track status and trends in the Massachusetts piping plover population. This statewide monitoring data is critical to determine any statewide population trends. The statewide monitoring data is also essential to determine the level of allowable take exposure under this Plan (see Chapter 3).

Effectiveness monitoring will evaluate the reproductive success of breeding pairs of piping plovers exposed to covered activities and will compare this result to the reproductive success of pairs not exposed. Effectiveness monitoring will provide information on the benefits of selective predator management relative to the benchmark established by Biological Objective 2 (Table 4-1). Effectiveness monitoring will also attempt to quantify and qualitatively evaluate the education, outreach, and increased law enforcement components of the mitigation plan.[31] Finally, efforts will be made to evaluate the extent to which the pilot nesting habitat improvement projects (i.e., vegetation management) influence patterns of habitat use and reproduction by piping plovers.

Effectiveness monitoring will inform the adaptive management plan enabling the DFW and the plan participants to improve the impact minimization measures and conservation actions in response to observations and lessons learned through the monitoring program (see Section 4.4.2).

[31] Based on DFW experience and input from stakeholders, the DFW included these elements as important components of the mitigation plan despite the challenges of measuring their benefits. This mitigation approach follows the three-part approach taken by the FWS and other agencies to restore piping plovers from a Buzzards Bay Oil Spill (http://www.fws.gov/northeast/PDF/BouchardJan2013.pdf; See also Section 4.3.2.1).

Table 4-8. Effectiveness Monitoring and Reporting Requirements

Element Tracked	Monitoring Objectives	Plan Participant Actions	DFW Actions	Reporting
Effectiveness of the impact minimization measures/Effects of the covered activities	• Ensure that effects of covered activities and associated minimization measures (see Section 3.2) are consistent with achieving the biological goal and objectives	• Ensure adequate monitoring of population size, nest, and fledging success, and causes of nest failure and mortality (see Effectiveness Monitoring) • Include observations of piping plover disturbance and mortality associated with covered activities in annual reporting; include recommendations to increase effectiveness of impact minimization measures	• Provide consultation, training, and technical assistance for beach managers and monitoring staff • Compile and analyze multi-site, multi-year data to evaluate effects of covered activities and effectiveness of impact minimization measures • Consult with scientific experts to refine analyses and control for confounding factors	• Include population monitoring results on Census Forms to the DFW; due September 30; Include other observations and recommendations in plan participant annual report to the DFW; due October 15 (see Section 5.2.2.3) • Include summary in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1)
Effectiveness of selective predator management (see Section 4.3.2.1)	• Ensure that mitigation measures are effective and consistent with achieving biological objective 2.	• Monitor predation rates and species-specific predator activity (e.g., track counts) to inform management at sites where selective predator management is or may be implemented. • At sites where selective predator management is implemented monitor the timing and effectiveness of removing the predators selected for management • Ensure adequate monitoring of population size, nest, and fledging success, and causes of nest failure and mortality at predator management sites (see Effectiveness Monitoring)	• Provide consultation, training, and technical assistance for beach managers and monitoring staff • Work with the USDA- Animal and Plant Health Inspection Service, the FWS, and other partners to compile and analyze data to: evaluate the long-term effectiveness of selective predator management; improve methods; and improve site selection criteria • Evaluate predator management reports and refine project and site selections	• Include population monitoring results and notes on predator activity on Census Forms to the DFW; due September 30; Include other observations and recommendations in plan participant annual report to the DFW; due October 15 (see Section 5.2.2.3) • Final annual reports on predator management to the DFW; due October 15 (see Section 5.2.2.3) • Include summary of predator management activities and results in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1) • Once every five years, detailed report on program efficacy (see Section 4.4.2)

Element Tracked	Monitoring Objectives	Plan Participant Actions	DFW Actions	Reporting
Effectiveness of education/outreach/ increased law enforcement (see Section 4.3.2.2)	• Ensure that mitigation measures are effective and consistent with achieving the biological goal and objectives	• Develop site- or project-specific[1] monitoring and evaluation plan with measurable objectives for pre-approval by the DFW • Monitor program reach and effectiveness (e.g., number of warnings and citations, number of workshops, number of symbolic fencing violations; measure of attitudinal change; changes in landowner willingness to implement conservation actions)	• Conduct site inspections; consult with project managers on program development and implementation • Evaluate proposals and final reports	• Include population monitoring results and notes on education/outreach and increased law enforcement activity on Census Forms to the DFW; due September 30 • Final annual report on all mitigation activities to the DFW; due October 15 (see Section 5.2.2.3) • Include summary of mitigation activities and results in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1)
Effectiveness of nesting habitat improvements (see Section 4.3.2.3)	• Ensure that mitigation measures are effective and consistent with achieving the biological goal and objectives	• Monitor changes in vegetation and piping plover habitat use within the habitat improvement area. Qualitatively assess any evidence of shifts in habitat use elsewhere on site in response to vegetation management. Perform multi-year monitoring and assess whether additional vegetation management to improve nesting habitat is warranted.	• Consult with beach managers on project design and implementation; conduct site inspections to monitor implementation	• Include population monitoring results and notes on effects of habitat enhancement activity on Census Forms to the DFW; due September 30 • Final annual report on all mitigation activities to the DFW; due October 15 (see Section 5.2.2.3) • Include summary of mitigation activities and results in the DFW annual report to the FWS; due February 15 (see Section 5.2.2.1)

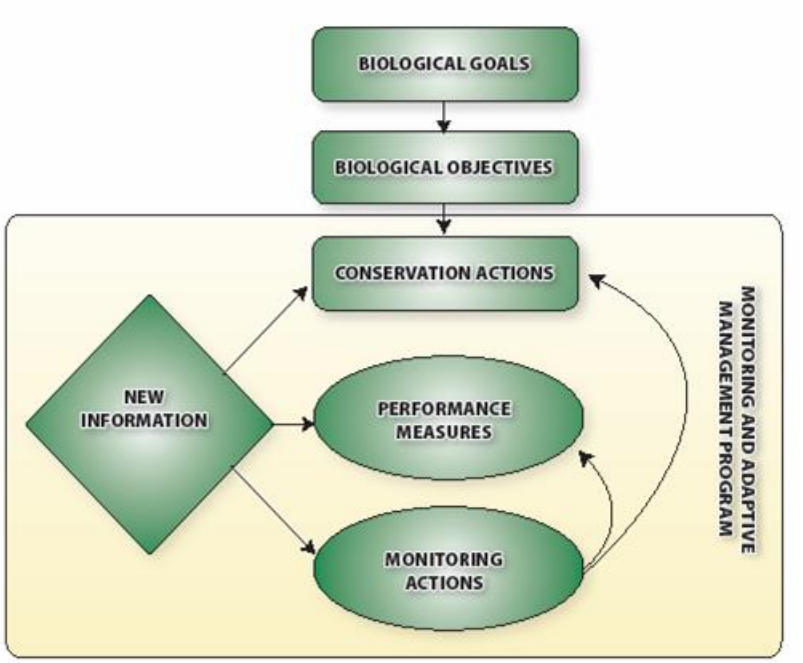
[1] As described in Chapter 5, some mitigation projects may be implemented by cooperators that are not plan participants, through funding provided by the DFW.
DFW = Massachusetts Division of Fisheries & Wildlife
FWS = U.S. Fish and Wildlife Service
USDA-APHIS = U.S. Department of Agriculture Animal and Plant Health Inspective Service

4.4.2 Adaptive Management

As described in the introduction to Section 4.4, adaptive management is a process whereby the Conservation Strategy is adjusted to respond to new information derived from Plan monitoring or other sources (e.g., new research). Adaptive management may lead to refinements to improve impact minimization measures and the implementation of mitigation. For example, monitoring may provide information that leads to improvements in the design of barriers to prevent piping plovers from accessing roads or in improvements to nest-moving techniques. Similarly, Plan monitoring or published scientific results could lead to improvements in trapping methods for mammalian predators. In addition, the strict limits on take exposure described in Section 3.4.2 will follow an adaptive management process as the number of permits authorized per year will vary based on the statewide population size.

Figure 4-1 illustrates how the adaptive management process will function during Plan implementation.

Figure 4-1. Adaptive Management Concept Model



In general, adaptive management will be limited to refinements to the impact minimization and mitigation measures presented in the Plan. Prior to implementing adaptive management actions; these measures will be presented as recommendations in the annual monitoring report that the DFW will provide to the FWS as part of Plan implementation (see Section 4.4.1 and Chapter 5). For each adaptive management technique, reporting will include the proposed change and justification. Adaptive management will be implemented as an iterative process whereby any changes will be

followed by additional monitoring to determine the effectiveness of the change, thereby facilitating continued improvements over time.

For example, adaptive management related to impact minimization measures might include the use of a new piece of equipment to smooth tire ruts in the OSV corridor to save time and money. Another example might be developing improved means of communication between monitors during escorting, if unanticipated coordination challenges are encountered. Any changes to the minimization plan as the result of adaptive management that change methods, protocols, or requirements presented in this Plan or ITP will follow the Plan amendment process provided in Section 5.3.3.

With respect to the mitigation plan, a major focus will be on improving selective predator management procedures over time and ensuring that the benchmark associated with Biological Objective 3 is being met. Refinements may include changes in the methods or timing of predator management as well as possible modifications in site selection. For example, sites with poor results for known or unknown reasons may be abandoned in favor of new sites. As described in Table 4-6, the DFW will report annually on net success and productivity rates at mitigation sites relative to baseline conditions (during the two years prior to implementation of selective predator management). Reporting will also take into account potentially confounding factors such as the frequency of nests lost to storm overwash. Any changes to the mitigation plan as the result of adaptive management that change methods, protocols, or requirements presented in this Plan or ITP will follow the Plan amendment process provided in Section 5.3.3.

In addition, because meaningful inferences about the efficacy of predator management require multiple years of data across multiple sites, the DFW will prepare a more detailed analysis and report on the efficacy of selective predator management every five years for the life of the Plan. This report will include an analysis comparing nest success and productivity at mitigation sites relative to appropriate control sites where no selective predator management is implemented, and may also contain more sophisticated statistical analyses developed in consultation with academic researchers. In the unlikely event that these five-year reviews indicate that Biological Objective 3 is not being met, the DFW will confer with the FWS about additional refinements that could be made to the selective predator management program within the context of the adaptive management program and the funding commitments being made by the DFW and plan participants (including associated contingency funding; see Chapter 5).

Under certain circumstances, it may be desirable to implement more substantive changes to the Conservation Strategy. For example, new mitigation options that are more effective or cost-effective than the mitigation measures presented in the Plan may emerge. It is not possible to predict all potential improvements in technology or scientific knowledge or to anticipate all new or emerging population threats. Should such circumstances arise, the DFW may elect to seek an amendment to the Plan to enable more substantive changes in the Conservation Strategy, subject to FWS approval (see Chapter 5).

This Plan does not include the use of predator exclosures to protect nests as a mitigation measure because of uncertainty about their effectiveness. However, the costs and benefits of predator exclosures is a topic of active research and preliminary results suggest that the use of exclosures may be beneficial in certain circumstances; consequently, the DFW is proposing to include deployment of predator exclosures as a potential future mitigation measure in the adaptive management framework. Should the best available science indicate a benefit to predator exclosures,

and methods to quantify the benefits become available, the DFW would propose predator exclosures as a mitigation option, subject to FWS approval.

Evidence to support the use of predator exclosures might include the following.

- Results from recent peer-reviewed scientific literature demonstrating the efficacy of predator exclosures to increase population growth rate, considering negative effects (e.g., adult mortality).
- Analyses of site-specific or statewide data, comparing nest success of exclosed vs. unexclosed nests and measuring other important parameters needed to estimate the efficacy of exclosures (e.g., frequency of renesting attempts, rates of nest abandonment, rates of inferred adult mortality).
- Scientifically valid modeling methods to quantify the net benefits of exclosures, using empirically derived parameter values, whenever possible, and considering uncertainty in key parameters (e.g., adult mortality rate associated with exclosures). Key parameters such as annual survivorship of adults and fledglings would be derived from the piping plover Population Viability Analysis presented in the Piping Plover Atlantic Coast Revised Recovery Plan (Melvin and Gibbs 1994) or credible new information to ensure the use of the best scientific information available.

In summary, to quantify the benefits of exclosures, if any, empirically derived estimates of increases in fledging success associated with the deployment of predator exclosures would be discounted by increases in adult mortality associated with exclosure abandonment. Analysis would also consider the fact that piping plovers experiencing nest failure may re-nest repeatedly. The DFW would present analysis and quantification of predator exclosure benefits for FWS approval, prior to offering this as a valid mitigation measure to plan participants. In the event that the best scientific evidence supports the conclusion that predator exclosures are effective in some settings but not others (e.g., high vs. low predation pressure beaches, history of exclosure use at site) or that the magnitude of the benefits vary, the DFW would incorporate this information into its proposed quantification.

Chapter 5

Plan Implementation, Assurances, and Funding

5.1 Overview

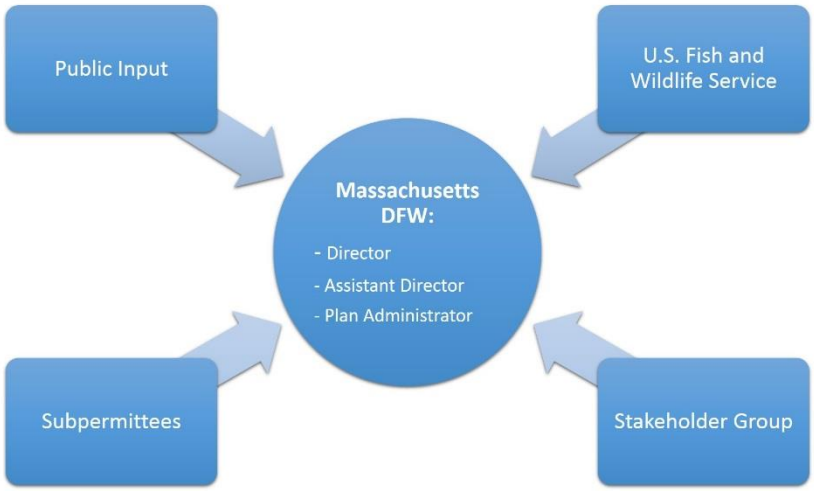
This chapter describes Plan implementation, requested regulatory assurances, and the costs associated with Plan implementation. The section on Plan implementation specifies the institutional arrangements, organizational structure, approval processes, and roles and responsibilities of the DFW, the FWS, and plan participants. The section on assurances describes the no-surprises policy, associated changed and unforeseen circumstances, and the modification process for changes to the Plan. The section on funding outlines the estimated cost to implement the Plan over the 25-year permit term and describes the funding sources that will pay for these costs. The ESA requires that HCPs specify "the funding that will be available to implement" conservation actions that minimize and mitigate impacts on covered species (16 USC 1539(a)(2)(A)).

5.2 Plan Implementation

5.2.1 Implementation Structure

This section describes the organizational structure that will be established to implement the Plan and the roles, functions, and responsibilities of the DFW in its implementation. The DFW will administer the Plan and will be responsible for executing the requirements of the Plan and day-to-day implementation of its requirements. The DFW will also coordinate implementation of the Plan with plan participants, the FWS, stakeholders, and other interests (see Figure 5-1).

Figure 5-1. Plan Organizational Structure



5.2.1.1 Massachusetts Division of Fisheries and Wildlife

The DFW's Natural Heritage and Endangered Species Program personnel will coordinate implementation of the Plan with the FWS, plan participants, and other stakeholders. The DFW will assign an employee to serve as the Plan administrator who will be responsible for managing Plan implementation and coordinating the work of staff and consultants responsible for implementing the Conservation Strategy (to include monitoring, reporting, and adaptive management). The DFW will also provide a GIS technician to track implementation of covered activities and conservation actions to demonstrate compliance with the Plan and with ITP terms and conditions. Senior biologists within the DFW will also be responsible for implementation of the Conservation Strategy.

The implementation structure within the DFW will be as follows.

- **Director, DFW:** The DFW Director will serve as the primary authority in the administration of the Plan. The Plan administrator may seek the Director's approval for policy decisions. However, day-to-day operational responsibility rests with the Plan administrator.
- **Assistant Director, DFW:** The DFW Assistant Director for the Natural Heritage and Endangered Species Program will serve as a senior technical resource to the Plan administrator, as well as the Division authority in the event that the Director is unavailable.
- **Plan Administrator:** The DFW will hire, appoint, or identify a point-of-contact to lead Plan implementation. This Plan administrator will be a DFW staff person whose responsibility will be to implement the Plan. The Plan administrator will oversee other DFW staff, as necessary, to accomplish day-to-day tasks, as well as contractors hired to perform specialized tasks, as needed. The Plan administrator will also serve as the point-of-contact at the DFW for the FWS.
- **Stakeholder Group:** As discussed in Section 1.4.1, *Stakeholder Group,* the DFW formed a stakeholder group in 2014 to solicit input on Plan development from state and federal agencies, environmental groups, beach managers, town leadership, beach landowners, beach users, and other interested parties. The DFW anticipates that these stakeholders will be interested in continuing to participate and provide input during Plan implementation. Therefore, the DFW will continue the stakeholder group throughout the implementation process. The stakeholder group will continue to be voluntary and informal, and will continue to play an advisory role to the DFW and the Plan administrator. The group will meet approximately semiannually for the first 5 years of Plan implementation. Meeting frequency may be increased during the first 2 years of implementation and reduced as necessary after the first 5 years of implementation. Stakeholder group meeting notes will be made publically available on the DFW website.

5.2.1.2 U.S. Fish and Wildlife Service

The FWS is the regulatory agency that issues the federal ITP and oversees implementation of the Plan. Therefore, it is important that the FWS remain an active participant in Plan implementation. The successful execution of the Conservation Strategy—including monitoring, reporting, and adaptive management actions that are part of the Plan—requires coordination between the DFW and the FWS. The DFW Plan Administrator will coordinate with the FWS at least quarterly and provide the FWS with annual reports (Section 5.2.2.1, *Annual Reporting*) concerning Plan implementation. Coordination is likely to be more frequent during the first several years of Plan implementation.

In addition, the stakeholder group meetings (as mentioned above) will keep the FWS apprised of progress towards biological goals and objectives, funding, monitoring, adaptive management, and other relevant topics. These meetings will serve as a means for the FWS to provide advice to the DFW before implementation of key conservation actions, such as habitat management, adaptive management, and monitoring. The meetings will also serve as a forum to troubleshoot potential issues before they affect permit compliance.

5.2.1.3 Plan Participants

This Plan provides the basis for the issuance of regulatory authorizations, under the ESA and MESA, for the incidental take of piping plovers resulting from covered activities (see Chapter 3). The DFW is the permittee for the Plan. Any nonfederal property owner of piping plover habitat may seek coverage from the DFW under the HCP as a plan participant. Likely plan participants are owners and operators of recreational public beaches such as municipalities, state agencies, and nonprofit environmental organizations. Other potential participants include private beach clubs and private beach owners. Those entities requesting incidental take coverage for activities covered under the Plan pursuant to Section 10(a)(1)(B) of the ESA and 321 CMR 10.23 are referred to as plan participants.

5.2.1.4 Scientific Review

The function of scientific review is to provide technical advice and to help assemble the best available scientific data on conservation actions, monitoring, and adaptive management. Scientists with expertise in conservation biology, beach management, and the ecology of the piping plover will provide input, as appropriate, to the DFW. While no formal scientific review committee will be established, the DFW and the FWS will work with the stakeholder group to establish a science advisory subcommittee comprised of biologists and beach managers with expertise in beach management, habitat management, species ecology, and biological monitoring. If necessary, additional outside experts not currently participating in the stakeholder group will be added to this subcommittee. The DFW will consult regularly with the science advisory subcommittee, as well as with outside scientists, on an ad hoc basis as issues arise related to species ecology, habitat management, and monitoring. Subcommittee meeting notes will be made publically available on the DFW website.

5.2.1.5 Public Input

Public inputis an important part of Plan implementation and can help the DFW generate continued support for the Plan throughout the implementation process. The DFW will use a website to provide key program information, reports, and contact information. All data and reports associated with the monitoring program for the Plan will be made available annually to the public through the project website.

5.2.2 Implementation Responsibilities

5.2.2.1 Massachusetts Division of Fisheries and Wildlife

The DFW will oversee Plan implementation and will retain all program records. DFW staff include biologists, administrators, and other natural resource specialists who carry out planning and design,

monitoring, adaptive management programs, and periodic coordination with and reporting to the FWS. To form a functional unit for carrying out this program, the DFW will assign HCP implementation responsibilities to specific individuals, including a Plan administrator, GIS technician, and biologists. The roles of these individuals are briefly described below. The DFW organizational structure and the specific roles and responsibilities of staff are expected to change over time to ensure the efficient implementation of the Plan.

Staff Positions

Plan Administrator

The Plan administrator will direct, oversee, and provide support for tasks such as the following.

- Answering internal Plan-related questions.
- Coordinating population surveys with biologists.
- Serving as the primary point-of-contact for Plan-related issues within the DFW, other state agencies, and with the FWS.
- Evaluating the effectiveness of the Plan's Conservation Strategy.
- Developing and maintaining annual budgets and work plans.
- Collecting relevant monitoring and survey data.
- Administering the DFW grant program to support piping plover conservation actions performed by municipalities and nongovernmental organizations.
- Developing and submitting annual reports to the FWS and to the public that charts Plan compliance and progress toward achieving the biological goals and objectives of the Plan.
- Overseeing the review and approval of plan participant applications for take allowances, including IAMPs.
- Overseeing the determination each fall of the number of take exposure allowances to be authorized under this Plan for the following beach season and allocated to the approved plan participants.
- Developing, coordinating, and delivering HCP training program(s) for DFW and plan participant staff.

GIS Technician

The DFW will use GIS or other equivalent spatially-explicit database systems to collect, store, and use spatial data necessary for Plan implementation. Compliance monitoring will be addressed in part through the GIS database system. To track compliance, the DFW will maintain the following baseline data.

- Piping plover population size in Massachusetts.
- Location and extent of breeding habitat for piping plovers in the plan area.
- The location, extent, and timing of implementation of all conservation actions.

To track progress towards achieving the Plan's biological goal and objectives, the GIS technician will also maintain a record of the following data.

- The location, extent, and timing of implementation of monitoring and adaptive management program actions.
- The location, extent, and timing of impacts to piping plovers and their habitat.

The comprehensive data repository for compliance tracking will be operating within 8 months of permit issuance. The data will also be linked to supporting information documenting Plan compliance. These reports and other data will be stored and archived electronically whenever possible.

Biologists

DFW biologist(s), beach managers, plan participant qualified shorebird monitors, partner nongovernmental organizations, or hired contractors will conduct piping plover surveys and implement impact minimization measures. They will work on the ground to evaluate compliance with the Guidelines; establish monitoring and reference sites; keep detailed and accurate field and analytical records; and use an information management system to track, control, and report as necessary to achieve the goals of the site-specific IAMPs and the goals and objectives of the Conservation Strategy.

Process for Implementing and Tracking Mitigation Measures

Plan participants may elect to implement mitigation measures directly on piping plover breeding sites under their control, or to provide funding for mitigation projects to be administered by the DFW (see Chapter 4). In the latter case, the DFW will be responsible for (1) awarding grants and procuring the services of contractors to carry out mitigation activities; (2) ensuring that over the course of the permit term, adequate mitigation is implemented to offset take exposure, in accordance with the commitments described in Chapter 4; (3) reporting on mitigation activities to the FWS; and (4) monitoring to assess the effectiveness of mitigation. The process for implementing and tracking mitigation will be as follows.

- Selective predator management mitigation to offset take from covered activities for a given piping plover breeding season will be carried out primarily in the late winter and early spring before implementation of the covered activities, continuing into the piping plover breeding season, as necessary (see Section 4.3.2.1, Table 4-3). Depending on the timing of ITP issuance, mitigation may not be able to be carried out in advance of covered activities during the first beach season after ITP issuance. Failure to offset take exposure in a timely fashion will be grounds for ITP suspension

Example: Predator Management Requirements

In a year when plan participants are authorized to expose 10 nests/broods/territories to covered activities, at least 25 pairs must benefit from selective predator management (2.5 pairs per take exposure allowance). The DFW would, through contracts, implement selective predator management for 25 pairs based on the prior season's population size. If only 20 pairs were actually present when predator management was implemented, the DFW would be responsible for carrying out additional predator management during the following season to benefit 5 more breeding pairs. These 5 pairs would be in addition to (not substitutable for) the required predator management for the following season.

by the FWS, thereby precluding implementation of covered activities until the mitigation "deficit" is addressed.

- In the event that a plan participant is conducting onsite mitigation, the plan participant will be required to allocate funds, secure contracts, and implement mitigation prior to and during the beach season when the covered activities are being carried out. Although mitigation will occur prior to the breeding season and implementation of the covered activities whenever practical, certain activities must extend into the breeding season to be effective (e.g., increased law enforcement, some selective predator management).[32]
- In the event that the plan participant provides funding for selective predator management and other MESA-related mitigation actions to be administered by the DFW, funding associated with a given year's covered activities must be paid in advance of carrying out that year's covered activities.
- Required funding amounts for mitigation to be administered by the DFW will be based on the costs associated with implementing the mitigation described in Chapter 4, including education and outreach, increased law enforcement, and selective predator management to benefit no less than 2.5 breeding pairs for every nest/brood/territory exposed to covered activities.
- The DFW will award grants and contracts to beach managers, nongovernmental organizations, and qualified contractors to carry out the required mitigation (e.g., selective predator management, outreach, law enforcement) in accordance with work plans approved in advance by the DFW. The FWS will be given the opportunity to review selective predator management work plans and contractor qualifications in advance of implementation.
- Based on the number of take exposure allowances to be authorized during a given beach season, the DFW will implement selective predator management to offset the anticipated level of take exposure before and during the beach season associated with those take allowances. The DFW reserves the right to make exceptions if coverage is extended to a new plan participant without adequate lead time, or due to other unforeseen circumstances. In this event, the DFW will implement the required mitigation as soon as possible, and demonstrate to the FWS that it is holding adequate funds in reserve to meet this obligation.
- Because the number of breeding pairs at a given selective predator management site will vary from year to year, the DFW will base the selective predator management contracts on the number of breeding pairs present during the previous year.[33] Therefore, the precise number of breeding pairs benefiting from selective predator management will not be known until after the breeding season. Any deficits in required predator management must be offset by additional predator management in the following breeding season (see Example above).
- Similarly, the DFW may collect funds and implement selective predator management on behalf of a plan participant that anticipates a nest in a parking lot. Because mitigation is required in

[32] As explained in Section 4.3.2, the only mitigation measure that will be counted towards the take offset pursuant to the ESA is selective predator management. Information about other mitigation measures is being provided to the FWS in this plan for informational purposes only, although these other measures are expected to produce significant piping plover conservation benefits.

[33] Similarly, plan participants electing to carry out selective predator management on their own properties will need to demonstrate that the anticipated number of breeding pairs is sufficient to achieve the required mitigation ratio based on the prior year's breeding census.

advance, if no nesting occurs, the plan participant would have provided extra mitigation. This "credit" may be carried forward for up to three subsequent breeding seasons.

- To track mitigation credits and deficits for each year, the DFW will monitor and report the following.
  - Actual number of nests/broods/territories exposed to covered activities.
  - Actual number of breeding pairs benefiting from selective predator management, whether implemented by plan participants or the DFW.
  - A quantification of the other mitigation measures, including an estimate of the number of breeding pairs benefiting, if applicable.[34]
  - Productivity of sites at which selective predator management was implemented.
  - Identification of causes of nest and/or chick loss and other parameters at sites benefitting from selective predator management to assess whether Objective 2 (see Table 4-1) is being met over time as further described in Section 4.4.1.2.
  - Any mitigation credits or deficits carrying over from prior years with documentation that no credits are being carried over for more than three breeding seasons (years).

Annual Reporting

The DFW will prepare annual reports over the term of the Plan that document permit compliance, impacts, conservation actions, management actions, and monitoring results. The annual reports will summarize the implementation activities within the previous calendar year and be provided to the FWS by February 15 following the reporting calendar year. No annual report will be required for the first, partial fiscal year. Annual reports will require synthesis of data collected by the DFW and plan participants and will report on important trends such as selective predator management and nest productivity. A due date of February 15 will allow time for the data from the previous piping plover breeding season to be assembled, analyzed, and presented in a clear and concise format. In addition to submitting the reports to the FWS, the DFW will make annual reports available to the public and post them to the Plan website.

The goals of the annual report are as follows.

- To provide the information and data necessary for the DFW to demonstrate to the FWS and the public that the Plan is being implemented properly.
- To disclose any problems with Plan implementation and the corrective measures planned or implemented to address the problem.
- To identify administrative or minor changes to Plan components required to increase the success of conservation actions.

Each annual report will contain the following information.

[34] Because no attempt is made to quantify the benefits of education and outreach or increased law enforcement, and these measures are not required to offset take exposure (see Tables 4-3a and 4-3b), this information will be provided for informational purposes only.

- Description of all covered activities implemented during the reporting period by activity type and location.
- Year-to-date and cumulative summary (i.e., from the start of the permit term) of temporary impacts to piping plover habitat resulting from covered activities.
- Year-to-date and cumulative (i.e., from the start of the permit term) quantification of exposure to incidental take of piping plover individuals demonstrating compliance with the authorized level of take on the ITP.
- Description of all experimental vegetation management actions implemented during the reporting period including a year-to-date and cumulative summary of the extent and location of land cover types enhanced through vegetation management.
- Assessment of the efficacy of vegetation management actions in achieving performance objectives and recommended changes to improve the efficacy of the methods.
- List of all plan participants authorized for take coverage.
- Accounting of all mitigation funds collected from plan participants during the previous year, and any unspent funds from previous years.
- Accounting of the cost of all mitigation measures implemented in the previous fiscal year and the expected cost of mitigation measures in the upcoming fiscal year.
- Record of any grants and Plan implementation contracts awarded to plan participants, other landowners, or implementation partners.
- Description of the adaptive management process used during the reporting period, if applicable.
- Summary for the reporting period of the monitoring program objectives, techniques, and protocols, including monitoring locations, variables measured, sampling frequency, timing and duration, and analysis methods.
- Assessment of the efficacy of the monitoring and research program and recommended changes to the program based on interpretation of monitoring results and research findings, if applicable.
- Description of all Plan-directed studies undertaken during the reporting period; a summary of study results; and a description of integration with monitoring, assessment, and compliance elements.
- Description of any actions taken or expected regarding changed circumstances, including remedial actions, if applicable.
- Description of any unforeseen circumstances that arose and responses taken, if applicable.
- Summary of any administrative changes, minor modifications, or major amendments proposed or approved during the reporting year (see Section 5.3.3, *Modifications to the Plan*).

Any information about mitigation measures other than selective predator management, the associated funding, and monitoring is being provided for informational purposes only as the FWS has indicated that these activities will not be counted as mitigation to offset take associated with the ITP.

A summary of key deadlines for plan implementation is included in Table 5-1.

Table 5-1. Summary of Key Deadlines

Key Task	Deadline(s)	Deadline Flexibility
Key Annual Deadlines		
Annual statewide piping plover census report published by the DFW	November 15	Flexible, but the DFW must make the annual report available to the FWS and the public at least 21 days in advance of updating the annual take allowance (see next row in table)
Update take allowance based on 3-year rolling average of statewide piping plover population size	Date to be determined by the DFW within the first year of Plan implementation	Take allowance can be delayed if the statewide piping plover census is delayed
Review plan participant applications and issue COIs	Date to be determined by the DFW within the first year of Plan implementation	
Plan participants to submit annual reports to the DFW with all required information	By October 15 of each year for the previous fiscal year	Extensions available with prior approval by the DFW
The DFW to submit annual report to the FWS with all required information	By February 15 of each year for the previous fiscal year	Extensions available with prior approval by the FWS
Key Periodic or One-Time Deadlines		
Complete pilot habitat management projects at a minimum of two sites	Year 5	
Detailed analysis and report on the efficacy of selective predator management every five years	Year 5	
Develop and vet methods for the first 5-year evaluation of predator management (to meet the commitment in Section 4.4.2, paragraph 5).	Year 5	

5.2.2.2 Consultants and Contractors

Consultants will be retained to meet any technical or scientific needs that cannot be effectively or efficiently addressed by in-house staff, as determined by the DFW. For example, outside biologists may be engaged for survey work, as necessary.

5.2.2.3 Plan Participants

The process for plan participants to apply for, obtain, and be allocated take exposure allowances by the DFW is described below.

Eligibility Criteria for Obtaining Certificate of Inclusion

- Any nonfederal land owner that implements the covered activities described in this Plan in piping plover habitat is eligible to apply for a COI to receive incidental take coverage under the DFW's HCP and ITP.
- Applicants must submit a request for coverage, an IAMP, and an appropriate mitigation plan, following the process and requirements established below.
- Applicants must show proof if ownership, or the owners' written assent to the COI application.
- Any necessary changes or amendments to management plans, or contracts required for complying with the COI conditions must be completed prior undertaking covered activities.
- Applicants must meet FWS eligibility criteria provided in 50 CFR Part 13 and Part 17.
- Applicants must be in compliance with all applicable state, Federal, or local laws and regulations before acting on a COI and implementing covered activities. Town ordinances and/or regulations must be compatible with full implementation of the covered activities and mitigation activities.
- If implementation of covered activities may cause take of other federally threatened or endangered species (besides piping plovers), applicants must demonstrate separate ESA compliance for COI eligibility.

Process for Obtaining Certificate of Inclusion and Allocating Take Exposure Allowances

In the first year of implementation, available take exposure allowances will be established and requests for coverage will be processed on a first-come-first-served basis.[35] Applicants are strongly encouraged to consult with the DFW well in advance of submitting a final application. Plan participants requesting participation in the Plan will file a Request for Coverage with the DFW by December 15 for coverage the following breeding season.[36] Requests for coverage will also serve as a MESA CMP application. The Request for Coverage will include the following.

1. **Site Determination.** Applicant will provide site map with site boundaries, and proof of ownership or written assent of landowner(s) to request coverage. In general, it is anticipated that site boundaries will reflect property lines and sections of recreational beach that have historically been managed as a single unit. The DFW reserves the right to reject proposed site boundary lines if the DFW determines that a site is being artificially

[35] If multiple applications are received at the same time resulting in oversubscription, the DFW will use a lottery system to determine plan participants. If an applicant applies for multiple take exposure allowances, the DFW may also elect to reduce the number of allowances to a given applicant in order to increase the number of plan participants. The DFW may elect to implement alternative distribution systems and will consult with stakeholders, as necessary.

[36] In the event of unexpected circumstances (e.g., colonization of a new piping plover breeding site; appearance of a nest in a parking lot never before occupied), the DFW may accept coverage requests outside of this timeframe and endeavor to expedite the approval process provided the applicant is able to provide all required information if the statewide limit has not been exceeded

segmented into smaller units in order to circumvent a maximum impact threshold set by the Plan. For example, a beach under single ownership that has historically been managed as a single unit cannot be artificially split in order to circumvent limits on the areal extent of reduced proactive symbolic fencing (e.g., by increasing the allowable impact to four acres rather than two). However, because piping plovers are mobile, and site boundaries are often arbitrary (e.g., based on property lines) and not biologically meaningful, the DFW will consider proposals from beach managers and landowners who request a single COI over multiple beaches (properties) in close geographic proximity. For example, two towns may own contiguous sections of beach and elect to coordinate their beach and plover management and submit a joint COI application. One entity may own multiple non-contiguous sections of beach in close proximity, managed as a single unit, and elect to concentrate OSV use in one section and mitigation in another under a single COI for the entire site.

2. **Site-Specific IAMP.** This plan will be based on the Guidelines and the impact measures described in this Plan.
3. **Mitigation Plan**. Plan participants will be responsible for mitigating their covered activities through a fee (see Section 5.4.3 *Funding*), by implementing mitigation within their jurisdiction, or a combination of these actions (see this Section, below).
4. **CMP Fee.** The CMP Fee schedule is posted on the DFW web site (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/mass-endangered-species-act-mesa/mesa-fee-schedule.html).

Each of these components is described below. Initially, the COIs will be issued for 3-year periods. A sample COI template is provided in Appendix B. The DFW may grant renewals but will reserve the right to require submittal of new applications if requests for coverage exceed the available number of statewide take exposure allowances. In this event, the DFW will consult with stakeholders to develop an equitable distribution system that balances the need to provide consistency for current participants with the ability to provide access to new participants.

All Requests for Coverage will be made available to the public and the FWS for review through the DFW website for at least 15 business days prior to COI issuance. The FWS will be notified via email of the start of the review period. In rare cases however, where the DFW decides to extend coverage to a potential plan participant who could not meet the required application deadline of December 15 due to circumstances the DFW determines to be beyond the participant's control (see footnote 36), the DFW will make the Request for Coverage available to the public and the FWS as far in advance as possible prior to issuing the COI, but will not be required to wait for conclusion of the typical 15-day review period.

All site-specific selective predator management plans will be made available to the FWS for review and approval, whether provided by potential plan participants as part of their site-specific IAMPs, or provided by the DFW for mitigation-related predator management activities administered directly by the DFW. The FWS will have 15 business days to review and approve each plan; if the FWS fails to respond in this timeframe, the site-specific predator management plan will be deemed to have been approved.

The DFW reserves the right to reject applications from applicants that have not complied with the Guidelines in the past. Excepting the allowance in the COI, plan participants must otherwise comply

with the Guidelines at all times. Applicants must also avoid take of other federally listed species or obtain an individual ITP if take cannot be avoided. For other MESA listed species (e.g., least tern), the applicant must either avoid take or work with the DFW to obtain coverage under the piping plover CMP. Finally, because the ITP being issued to the DFW is only effective for an otherwise lawful activity, each plan participant's CMP/COI will contain a provision stating that it is not actionable unless carried out in accordance with all applicable state, local, and federal laws and regulations. For example, a COI holder for activities requiring a valid Order of Conditions (OOC) pursuant to the Massachusetts Wetland Protection Act (e.g., beach raking or OSV use; 310 CMR 10.00), will not be able to carry out covered activities or act on the COI until a valid OOC is issued.

As described in Chapter 3, the total number of take exposure allowances available in a given year will be based on the statewide piping plover population size, as measured by the number of breeding pairs as indicated by the Adjusted Total Count on the DFW plover census form and calculated as a 3-year rolling average. Furthermore, the number of nests/broods/territories to be exposed to covered activities at a given site may not exceed 15% of the number of breeding pairs present at the site during the prior year, or a maximum of one nest/brood/territory for sites with fewer than seven pairs.[37] This limit on site-specific impacts helps to spread out take exposure across sites, although sites are generally defined by property boundaries and lack biological significance as management units. Although the DFW supports this approach, which will help to equitably distribute take exposure allowances, the DFW reserves the right to increase the allowable exposure to 30% at up to five sites per year. At these sites, limits on reduced symbolic fencing could also be increased to 20% of habitat or four acres, whichever is. This will provide the DFW and beach operators with increased flexibility at a limited number of sites.

Take exposure allowances will be allocated to plan participants on a 3-year rolling basis (e.g., a COI may authorize two broods/nests/territories to be exposed to covered activities at a given site). If less than the annual maximum allowable take exposure allowances are used during the first or second year of the COI, mitigation credits associated with the unused take exposure allowance(s) can be carried over for up to three years as described above. However, any mitigation credits that are unused after the third year of the COI cannot be rolled over, even if the COI is renewed for another three years.

Once a plan participant is extended COI coverage by the DFW, any changes to the site-specific IAMP must be approved by the DFW. Minor changes may be approved informally via email or phone followed by a supporting email; however, major changes may require revision of the relevant IAMP.

In the event of a population decline that reduces the number of available take exposure allowances, the DFW will modify or suspend the COI as necessary to ensure that the statewide take exposure limits are never exceeded.[38] Similarly, plan participants may request modifications to their COIs to allow additional take exposure and covered activities if statewide limits are not being exceeded. In

[37] Because piping plovers are mobile, and site boundaries are often arbitrary (e.g., based on property lines) and not biologically meaningful, the DFW may define a "site" to include multiple beaches in close geographic proximity and under unified management.

[38] For example, the DFW may implement a lottery system to determine which current COI holders will have to reduce or suspend take exposure during the three-year COI term in order to avoid exceedance of statewide limits. There are a number of ways this could be carried out. For example, a straight lottery versus a lottery applying only to those plan participants that have already acted on their COI for a year or more. Other options may be explored in consultation with stakeholders and plan participants.

the event that requests for coverage exceed the statewide take exposure limits, the DFW will implement first-come first-serve allocation of COIs as described above, and consult with stakeholders about alternative systems for allocating the available COIs.

Impact Avoidance and Minimization Plan (IAMP)

To obtain take exposure allowances under this Plan, plan participants will be required to submit site-specific IAMPs for DFW approval. To be approved by the DFW, each IAMP must accomplish the following.

- Identify the technical staff responsible for preparing, implementing, and updating the plan and describe their credentials (requires prior DFW written approval).
- Demonstrate adherence to the Guidelines for all applicable management and operations with the exception of carrying out the covered activities.
- Include a detailed analysis of the following components of the site.
    - Physical characteristics, including information about property size, map of property, and ownership.
    - Piping plover habitat, population size, and past reproductive success.
    - Predators of concern and their past impact on plover productivity.
- List the covered activities that are proposed to be implemented, and the number of broods/nests/territories proposed to be exposed to covered activities. This may include contingencies such as the implementation of reduced nest buffers *or* nest moving depending on circumstances that may arise in a given breeding season.
- Describe detailed protocols for compliance with each relevant impact minimization measure described in this Plan (see Chapter 3).
- Describe site and/or project-specific monitoring and evaluation measures with measurable objectives for pre-approval by the DFW.
- Include an annual budget demonstrating the ability to fund and staff each management or impact minimization measure and associated monitoring. If the timing of plan participant budget cycles do not allow for approval of an annual budget prior to submittal of this plan, a budget proposal to be subsequently approved and funded during the following budget cycle will suffice.

Mitigation Plan

As explained in Chapter 4, plan participants have the choice of mitigating the impacts of their covered activities in one of two ways. Plan participants can either provide funding for the DFW to implement mitigation (including predator management, educational outreach or increased law enforcement) or implement mitigation themselves. A combination of these two approaches can also be selected, but that would need to be explained in the mitigation plan. If a plan participant elects to provide funding for mitigation to be administered by the DFW, the mitigation plan needs to explain that and confirm how much funding will be provided to DFW annually prior to implementation of the covered activities and how much mitigation will need to be achieved by DFW with that funding. As described in Chapter 4, the DFW would use the funds to implement selective predator management (sufficient to off-set the take allocated to the plan participant). In addition, DFW may

implement education and outreach and increased law enforcement at appropriate piping plover breeding sites.

If plan participants elect to implement their own mitigation onsite, the mitigation plan must include the following.

- Detailed description of the proposed mitigation activities.
- A description of how the proposed mitigation activities will benefit piping plovers, including a quantitative assessment if possible.
- A proposed monitoring plan for the mitigation activities, including specific criteria to assess effectiveness.
- Itemization of costs for implementing the mitigation program.

Regardless of the specifics of each plan participant's mitigation plan, the DFW and the plan participants will be obligated, collectively, to implement the measurable selective predator management commitments described in Chapter 4.

Plan Participant Annual Report

Plan participants will prepare annual reports over the term of the Plan that document permit compliance, impacts, conservation actions, management actions, and monitoring results. The annual reports will summarize the previous year's implementation activities and be provided to the DFW by October 15 of each year. The DFW will assemble and synthesize the data provided in all plan participant reports for inclusion in their annual report submitted to the FWS.

Plan participant annual reports must include a record of the following.

- Activity log and invoices to document that the IAMP is being carried out by qualified personnel in accordance with the DFW-approved plan and budget.
- A log of initiation date(s) for covered activities, numbers of pairs, broods, nests, chicks, territories exposed, and locations; this log must be available for inspection by the DFW/FWS upon request.
- Annual monitoring of the site's population size, nest success (eggs hatched) and fledging success, and causes of nest failure and mortality.
- Standardized observations of piping plover disturbance and mortality associated with covered activities.
- Predation rates and species-specific predator activity to inform management.
- At sites where selective predator management is implemented, record of the timing and effectiveness of removing the predators selected for management.
- At sites where vegetation management is implemented, changes in vegetation and piping plover habitat use within the habitat improvement area.
- Program reach and effectiveness (e.g., number of warnings and citations; number of workshops; number of symbolic fencing violations; measures of attitudinal change; changes in landowner willingness to implement conservation actions).
- A description of any changes made to the site-specific IAMP during the reporting period.

Non-compliance and Enforcement

Failure to adhere to the terms and conditions of the COI, the Plan and the CMP would constitute violations of the ESA and MESA, as applicable. In the event of non-compliance, the DFW will immediately notify the plan participant in writing of the nature of the non-compliance and request immediate action to bring activities back into compliance. As stated in the COI template (see Appendix B), depending on the nature and severity of the non-compliance, the DFW reserves the right to immediately and unconditionally suspend or revoke the COI. Significant non-compliance may result in additional enforcement action pursuant to MESA and the ESA.

Failure to offset take exposure in a timely fashion will be grounds for ITP suspension by the FWS, thereby precluding implementation of covered activities until the mitigation "deficit" is addressed.

Detailed information about plan participant requirements for monitoring, breeding activity, and implementation of site management, impact minimization, and mitigation activities is provided in Tables 4-7 and 4-8, including, but not limited to, the requirement to maintain contemporaneous logs to be made promptly available on request at any time from the DFW/FWS.

5.3 Changed and Unforeseen Circumstances

This section discusses the assurances requested by the DFW that will accompany the ITP issued by the FWS.

5.3.1 Unforeseen Circumstances

Unforeseen circumstances are defined as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the FWS at the time of the negotiation and development of the plan and that result in a substantial and adverse change in the status of the covered species. (50 CFR 17.3)

The FWS bears the burden of demonstrating that unforeseen circumstances exist using the best available scientific and commercial data available while considering certain factors (50 CFR 17.22(b)(5)(iii)(C)). In deciding whether unforeseen circumstances exist, the FWS shall consider, but not be limited to, the following factors (50 CFR 17.22(b)(5)(iii)(C)).

1. The size of the current range of the affected species.
2. The percentage of the range adversely affected by the covered activities.
3. The percentage of the range that has been conserved by the HCP.
4. The ecological significance of that portion of the range affected by the HCP.
5. The level of knowledge about the affected species and the degree of specificity of the conservation program for that species under the HCP.
6. Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the species in the wild.

In negotiating unforeseen circumstances, the FWS will not require the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water or other natural resources beyond the level otherwise agreed upon for the species covered by the HCP

without the consent of the permittee (50 CFR 17.22(b)(5)(iii)(A)). If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the FWS may require additional measures of the permittee where the HCP is being properly implemented only if such measures are limited to modifications within conserved habitat areas, if any, or to the HCP's operating conservation program for the affected species, and maintain the original terms of the plan to the maximum extent possible (50 CFR 17.22(b)(5)(iii)(B)). Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee.

Notwithstanding these assurances, nothing in the "No Surprises" Rule "will be construed to limit or constrain the FWS, any Federal agency, or a private entity, from taking additional actions, at its own expense, to protect or conserve a species included in a conservation plan." (50 CFR 17.22(b)(6)).

Changed circumstances are defined by federal regulation as those circumstances affecting a species or geographic area covered by the HCP that can be reasonably anticipated by the applicant or FWS and to which the parties can plan a response (50 CFR 17.3).

5.3.2 Changed Circumstances

Under Section 10 of the ESA, an HCP is required to identify anticipated and possible changed circumstances that could arise during Plan implementation. Identifying strategies and protocols for addressing such anticipated changes allows for appropriate program adjustments without having to amend the Plan.

The changed circumstances and their contingency actions are described below for the following circumstances.

- New Species Listings
- Climate Change
- Coastal Erosion, Sea Level Rise, and Flooding

It is important to note that, because the take limits defined in Chapter 3 are predicated on piping plover population size, outside factors, such as those described below for changed circumstances, do not pose the risk to species inherent in other HCPs. Rather, the take limit approach is self-correcting and will reduce take allowance if anticipated (climate change, coastal erosion) or unanticipated changes occur.

5.3.2.1 New Species Listings

Over the course of the permit term (25 years), FWS could list as threatened or endangered under the ESA species that are not covered under this Plan. The FWS will notify the DFW when a non-covered species associated with piping plover habitat might be or has been proposed for listing ("new non-covered species"). Once the DFW becomes aware that a new non-covered species associated with piping plover habitat has been proposed for listing, the following measures will be taken.

- **Conduct an impact assessment:** The potential impacts of the covered activities on the new non-covered species will be evaluated. If the DFW determines that the new species occurs or

could occur in piping plover habitat and could be adversely affected by covered activities, the DFW and plan participants will develop measures, in coordination with the FWS, to avoid impacts to the proposed species. If necessary, covered activities will be suspended until these measures are in place.

- **Apply for permit amendment or alternative take coverage:** If the impact analysis indicates that take authorization is required to fully implement the covered activities, the DFW will apply for a permit amendment. In most cases, permit amendments to include additional covered species are treated as a major amendment under the FWS Section 10 regulations. Alternatively, the DFW could apply for a new and separate permit. The DFW will continue to work with the FWS to develop and implement interim guidelines to avoid take until the permit amendment or a new ITP is finalized.

5.3.2.2 Climate Change

As discussed in Chapter 2, climate change has the potential to result in sea-level rise, coastal flooding, and an increase in the frequency and/or severity of coastal storms leading to shoreline change (see Sections 2.2.3 *Climate and Climate Change* and the "Threats" discussion in Section 2.3.2 *Piping Plover*). As these are the primary drivers through which climate change may impact piping plovers and their habitat, the changed and unforeseen circumstances for climate change, as well as the DFW's response to these changes, is discussed below in Section 5.3.2.3 *Coastal Erosion, Sea Level Rise, and Flooding.*

5.3.2.3 Coastal Erosion, Sea Level Rise, and Flooding

Coastal Erosion

Coastal erosion and accretion (i.e., accumulation) are constant processes by which the wind and sea alter the shoreline through the transport of sand, pebbles, and other materials. Shorelines tend to accrete during the summer months, due to sediment deposition by relatively low energy waves, and erode during the winter, due to high energy storm waves, such as those generated by northeasters. Rising sea levels and an increase in the frequency of severe storms are expected to increase the rate of shoreline change over the permit term.

The Massachusetts Shoreline Change Project has produced maps of the Massachusetts coastline from the mid-1800s to the present. These data are used to project both short-term and long-term rates of shoreline change across the state in order to facilitate future planning and development efforts (Commonwealth of Massachusetts 2015).

The 2013 update of the Massachusetts Shoreline Change Mapping and Analysis Project developed projections of the maximum rate of shoreline change expected in 10 geographic regions of the state over an approximately 30-year period (Table 5-2).

Table 5-2. Maximum Rates of Shoreline Change in Massachusetts[1]

	30-year Rate	
Region (N to S)	**Rate (meters per year)**	**Location**
Maximum Erosion		
North Shore	-16.3 ±12.8	Sandy Point
Boston	-7.7	Nickerson Beach
South Shore	-5.5 ±2.8	Plymouth Beach
Cape Cod Bay	-4.2 ±3.3	Chapin Memorial Beach
Outer Cape Cod	-17.0 ±10.0	Monomoy Island
South Cape Cod	-2.6 ±2.5	Chatham
Buzzards Bay	-1.7 ±1.7	Demarest Lloyd Beach
Elizabeth Islands	-3.8	Nonamesset Island
Martha's Vineyard	-5.7 ±2.4	Norton Point
Nantucket	-12.4 ±1.5	Tuckernuck Island
Maximum Accretion		
North Shore	5 ±3.9	Plum Island
Boston	4.7	Quincy
South Shore	5.6 ±1.7	Plymouth Beach
Cape Cod Bay	11.5 ±11.2	Sandy Neck
Outer Cape Cod	42.6 ±41.8	Monomoy Island
South Cape Cod	2.3 ±1.4	Sampsons Island
Buzzards Bay	2.3 ±0.3	Taylor Point
Elizabeth Islands	1.7	Cuttyhunk
Martha's Vineyard	3.7 ±3.7	East Beach
Nantucket	5.5 ±4.6	Esther Island

Source: Thieler et al. 2013.
[1] Negative values indicate erosion; positive values indicate accretion. ± Indicates plus or minus.

These estimated rates of shoreline change are based on an extensive analysis of historical data and forecasted changes (Thieler et al. 2013). Therefore, such changes in beach erosion and accretion are foreseeable over the 25-year permit term. Beach erosion in excess of these values are considered unforeseen for the purposes of this Plan.

The Plan already anticipates substantial beach erosion and accretion occurring, as described in Chapter 1 (see Section 1.2.2). The plan area is intended to capture all currently suitable Massachusetts piping plover breeding habitat, as well as the area within which additional piping plover breeding habitat could develop during the permit term due to the dynamic nature of the coastline. Therefore, no remedial actions are necessary in response to beach accretion. New piping plover habitat would be incorporated into the plan area and its conservation and monitoring program. Piping plover habitat lost to beach erosion within the changed circumstance defined in Table 5-2 would be taken into account during the annual assessments of population size and population trends. In the event of a population decline due to beach erosion or other factors, these population data would be used to automatically reduce the annual limits of take exposure for the following season, or even eliminate all take exposure allowances as described in Chapter 4.

Therefore, no additional remedial actions are necessary in response to the beach erosion changed circumstance.

Sea Level Rise and Flooding

In Massachusetts, sea level rise poses threats to coastal ecosystems that may become inundated, resulting in habitat change or loss and adverse impacts to species that depend on these habitats. While sea level rise is a global phenomenon, the Northeastern United States has experienced particularly high rates of sea level rise, primarily due to land subsidence. In this region, sea levels have risen by approximately 1 foot in the last century, resulting in coastal flooding and shifting coastlines. This trend is projected to continue over the course of the permit term, with sea level rise along the coastal Northeast continuing to exceed the global average (Horton et al. 2014).

The latest National Climate Assessment (2014) indicates that global sea level rise is likely to be in the range of 1 to 4 feet by 2100 (Walsh et al. 2014; Parris et al. 2012). A sea level rise of just 2 feet, without any changes in storms, is anticipated to more than triple the frequency of dangerous coastal flooding throughout most of the Northeast (Horton et al. 2014).

Table 5-3 presents the projected sea level rise and number of flooding events per year expected at 3 points along the Massachusetts coastline in 2030 and 2045.

Table 5-3. Projections for Sea Level Rise and Coastal Flooding Frequency in Massachusetts

	Projected Sea Level Rise (inches)		Projected Coastal Flooding (events per year)		
Tide Gauge	**2030**	**2045**	**2014**	**2030**	**2045**
Boston	5.0	11.1	11	31	72
Nantucket Island	5.6	12.2	1	3	12
Woods Hole	5.2	11.4	0	0	0

Source: Spanger-Siegfried et al. 2014.

Based on historic measurements of sea level rise in the Northeast and these projected changes in sea level rise and coastal flooding in Massachusetts, it is foreseeable that the most vulnerable parts of the plan area could experience sea level rise of up to 12.2 inches and up to 72 flooding events per year.[39] Sea level rise and flooding in excess of these values are unforeseen for the purposes of this Plan.

In response to sea level rise and flooding, the following remedial actions are proposed.

- **Automatic adjustment of plan area:** If shorelines change due to erosion and sea level rise as projected, the location of piping plover breeding habitat will shift. As defined in Chapter 1, the plan area automatically adjusts in response to erosion or accretion to include a 300-yard zone along the Massachusetts coast. However, the DFW will provide the FWS and the public with an

[39] Projections in Table 5-3 extend to 2045, approximately 5 years after the permit would end for this HCP in 2040. However, for the purposes of the definition of changed circumstances, the 2045 data are used because it is the closest to the end of the permit term.

updated map of the plan area at least once every five years, and more frequently in response to major coastal storms, if practical.

- **Modify or enhance monitoring:** The monitoring program described in Chapter 4is based on the current plan area and population levels. If piping plover populations increase or decrease in response to shifting habitats associated with coastal erosion, sea level rise, and flooding, the monitoring program would adapt to tracking new population levels and locations.

In addition to these remedial actions, piping plover habitat as a result of sea level rise would be taken into account during the annual assessments of population size and population trends. These population data would be used to automatically reduce the annual limits of take exposure for the following season, or even eliminate all take exposure allowances within the limits specified in Chapter 4.

5.3.3 Modifications to the Plan

The Plan and/or ITP may be modified in accordance with the ESA, the FWS's implementing regulations, and this chapter. Plan and permit modifications are not anticipated on a regular basis; however, modifications to the Plan and/or ITP may be requested by either the DFW or the FWS. The FWS also may amend the ITP at any time for just cause, and upon a written finding of necessity, during the permit term in accordance with 50 CFR 13.23(b). The categories of modifications are administrative changes, minor amendments, and major amendments.

5.3.3.1 Administrative Changes

Administrative changes are internal changes or corrections to the Plan that may be made by the DFW, at its own initiative, or approved by the DFW in response to a written request submitted by the FWS. Requests from the FWS shall include an explanation of the reason for the change as well as any supporting documentation.

Administrative changes on the DFW's initiative do not require preauthorization or concurrence from the FWS. Administrative changes are those that will not (a) result in effects on a Plan species that are new or different than those analyzed in the Plan, the FWS's environmental action statement (EAS), or the FWS's biological opinion (BO), (b) result in take beyond that authorized by the ITP, (c) negatively alter the effectiveness of the Plan, or (d) have consequences to aspects of the human environment that have not been evaluated. The DFW will document each administrative change in writing and provide the FWS with a summary of all changes, as part of its annual report, along with any replacement pages, maps, and other relevant documents for insertion in the revised document.

Examples of administrative changes are listed below.

- Corrections of errors in the Plan that do not change the intended meaning or obligations.
- Corrections of any maps, tables, or appendices in the HCP to reflect approved amendments, as provided below, to the HCP or ITP.
- Day-to-day implementation decisions, such as modifying vegetation management techniques at experimental sites.
- Conducting additional monitoring surveys.

- Modifying HCP monitoring protocols to align with FWS monitoring protocols as they may be modified in the future.
- Changes to the DFW staff serving as DFW Director, DFW Assistant Director, or the Plan administrator, or changes to membership of the stakeholder group without changing the representation of the DFW.

5.3.3.2 Minor Amendments

Minor amendments are small changes to improve implementation of this Plan that will not significantly alter what is presented in this Plan in terms of effects to covered species, how the Conservation Strategy will be implemented, or the DFW's ability to achieve the biological goals and objectives of the Plan. Such amendments also will not increase impacts to species, their habitats, and the environment beyond those analyzed in the Plan, the FWS EA, and the FWS BO or increase the levels of take beyond that authorized by the ITP. Minor amendments may require an amendment to the ITP. A proposed minor amendment must be approved in writing by the FWS and the DFW before it may be implemented. A proposed minor amendment will become effective on the date of the joint written approval.

The DFW or the FWS may propose minor amendments by providing written notice to the other party. The party responding to the proposed minor amendment shall respond within thirty (30) days of receiving notice of such a proposed modification. Such notice shall satisfy the provisions of 50 CFR13.23 as well as include a description of the proposed minor amendment; the reasons for the proposed amendment; an analysis of the environmental effects, if any, from the proposed amendment, including the effects on Plan species and an assessment of the amount of take of the species; an explanation of the reason(s) the effects of the proposed amendment conform to and are not different from those described in this Plan; and any other information required by law. When the DFW proposes a minor amendment to the Plan, the FWS may approve or disapprove such amendment, or recommend that the amendment be processed as a major amendment as provided below. The FWS will provide the DFW with a written explanation for its decision. When the FWS proposes a minor amendment to the Plan, the DFW may agree to adopt the amendment or choose not to adopt the amendment. The DFW will provide the FWS with a written explanation for its decision. The FWS retains its authority to amend the ITP; however, consistent with 50 CFR 13.23.

Examples of minor amendments are listed below.

- Updates to the plan area or species occurrence data that are consistent with the predictions and expectations of the HCP.
- Minor changes to the biological goal or objectives in response to adaptive management.
- Minor changes to survey or monitoring protocols that are not proposed in response to adaptive management.[40]
- Modification of monitoring protocols for Plan effectiveness not in response to changes in standardized monitoring protocols from the FWS or others.
- Modification of existing or adoption of additional conservation actions that improve the likelihood of achieving biological objectives.

[40] Such changes are subject to the federal No Surprises regulation.

- Discontinuation of ineffective conservation actions and adoption of new conservation actions that improve the likelihood of achieving biological objectives (e.g., adding use of predator exclosures as a mitigation option under the Plan).
- Modification of existing or adoption of new performance indicators or standards if results of monitoring and research or new information indicate that the initial performance indicators or standards need revision.
- Modification of the impact minimization measures in response to adaptive management.
- Minor changes to the reporting protocol.
- Other changes that do not result in adverse effects on piping plovers beyond those analyzed in the HCP and the associated biological opinion and do not limit the ability of the DFW to achieve the biological goal and objectives of the HCP.

5.3.3.3 Major Amendments

A major amendment is any proposed change or modification that does not satisfy the criteria for an administrative change or minor amendment. Major amendments to the Plan and ITP are required if the DFW desires, among other things, to modify the projects and activities described in the Plan such that they may affect the impact analysis or Conservation Strategy of the Plan, affect other environmental resources or other aspects of the human environment in a manner not already analyzed, or result in a change for which public review is required. Major amendments must comply with applicable permitting requirements, including the need to comply with NEPA, the NHPA, and Section 7 of the ESA.

In addition to the provisions of 50 CFR 13.23(b), which authorize the FWS to amend an ITP at any time for just cause and upon a finding of necessity during the permit term, the HCP and ITP may be modified by a major amendment upon the DFW's submission of a formal permit amendment application and the required application fee to the FWS, which shall be processed in the same manner as the original permit application. Such application generally will require submittal of a revised Plan and preparation of an environmental review document in accordance with NEPA. The specific document requirements for the application may vary, however, based on the substance of the amendment. For instance, if the amendment involves an action that was not addressed in the original Plan or NEPA analysis, the documents may need to be revised or new versions prepared addressing the proposed amendment. If circumstances necessitating the amendment were adequately addressed in the original documents, an amendment of the ITP might be all that would be required.

Upon submission of a complete application package, the FWS will publish a notice of the receipt of the application in the Federal Register, initiating the NEPA and Plan public comment process. After the close of the public comment period, the FWS may approve or deny the proposed amendment application. The DFW may, in its sole discretion, reject any major amendment proposed by the FWS.

Examples of changes that would require an amendment include those listed below.

- Addition of covered species to the Plan.
- Increase in the allowable take limit of existing covered activities or addition of new covered activities to the HCP.

- Modifications of any important action or component of the Conservation Strategy under the HCP, including funding, that may substantially affect levels of authorized take, effects of the covered activities, or the nature or scope of the Conservation Strategy.
- A major change in the biological goal and objectives or conservation actions if monitoring or research indicates that they are not attainable because technologies to attain them are either unavailable or infeasible.

5.4 Cost and Funding

5.4.1 Cost to Implement the Plan

As described in Section 5.2.2.1 above, DFW staff will oversee implementation of the Plan. DFW staff includes the Plan administrator, GIS/database managers, biologists, beach managers, and other natural resource specialists that carry out planning and design, monitoring, adaptive management, and periodic coordination with and reporting to the FWS.

DFW costs to implement the Plan are divided into two categories.

- Program Administration.
- Monitoring and Adaptive Management.

The estimates of costs associated with these program elements are summarized in Table 5-4 and described below. Costs estimates for Plan implementation are reported in undiscounted 2014 dollars.[41] All cost components are expected to change over time due to local inflation, and DFW and the plan participants will provide adequate funding to fully implement the Plan, on an inflation-adjusted basis. These cost estimates are annualized across the 25-year permit and represent an average DFW annual commitment of 0.73 Full Time Equivalents of staff. The actual annual costs in the early years of Plan implementation are expected to be less than the annualized averages presented here because fewer plan participants (and less take exposure allowance requests) are expected earlier in the permit term than later in the permit term.

[41] This means the estimates exclude future inflation. Reporting costs in (inflation-adjusted) constant dollars allows for a more accurate comparison of relative expenditure over time. These estimates, however, are not indicative of nominal dollar outlays that will be required over the permit period and should not be used directly for financial planning, where use of nominal values would be most appropriate.

Table 5-4. Summary of DFW Plan Implementation Costs

		Full-time Employees	Rate	Annualized Cost	Cost Over 25 Year Permit Term
Program Administration					
	Staff Time (Coordination, Reporting, Agency Meetings, Contracting Offsite Mitigation)				
	Program Coordinator	0.2	$85,000.00	$17,000.00	$425,000.00
	Assistant Director	0.05	$100,000.00	$5,000.00	$125,000.00
	Biologists	0.1	$98,000.00	$9,800.00	$245,000.00
	GIS Manager	0.03	$60,000.00	$1,800.00	$45,000.00
	Materials and Direct Costs			$5,000.00	$125,000.00
	Start-Up Costs				
	Staffing Add-on			$10,080.00	N/A
	Material Add-On			$10,000.00	N/A
	Subtotal Annualized Cost (Staff)			$34,003.20	$850,080.00
	Subtotal Annualized Cost (Materials)			$5,400.00	$135,000.00
	Subtotal Program Administration			$39,403.20	$985,080.00
Monitoring and Adaptive Management					
	Staff Time (Statewide Population monitoring)				
	Biologists	0.1	$98,000.00	$9,800.00	$245,000.00
	Administrative Assistant	0.07	$45,000.00	$3,150.00	$78,750.00
	Subtotal Statewide Population Monitoring			$12,950.00	$323,750.00
	Staff Time (Effectiveness and compliance monitoring)				
	Program Coordinator	0.1	$85,000.00	$8,500.00	$212,500.00
	Biologists	0.08	$98,000.00	$7,840.00	$196,000.00
	Subtotal Effectiveness and Compliance Monitoring			$16,340.00	$408,500.00
	Subtotal Monitoring and Adaptive Management			$29,290.00	$732,250.00
			SUBTOTAL	$68,693.20	$1,717,330.00
Contingency[1]				$3,434.66	$85,866.50
		TOTAL COST		$72,127.86	$1,803,196.50

[1] For unanticipated incidental expenses.

5.4.1.1 Program Administration

Program administration involves ongoing or yearly costs associated with staff time for coordination, agency meetings, reporting, and Plan implementation. In addition, staff will be needed to maintain and update a database to track impacts and mitigation in the plan area and to collect, store, and use relevant spatial data necessary for the HCP. These data will be maintained to track compliance and to guide monitoring and adaptive management programs. Program administration also includes up-front or one-time costs associated with systematic changes to project management and tracking systems. These changes will require that HCP compliance training be performed.

Program administration costs, including training costs, are as follows.

- DFW HCP staff time (coordination, reporting, agency meetings).
- Development of training materials.
- Database and GIS system maintenance.
- Public outreach.
- New equipment and resources associated with the HCP.

Program administration costs are estimated to be approximately $39,403 per year over the life of the permit term (see Table 5-4).

5.4.1.2 Conservation Strategy

The Conservation Strategy implements the biological goal and objectives of the Plan. DFW staff will be necessary to implement the Conservation Strategy by overseeing avoidance and minimization measures, designing and implementing mitigation actions, monitoring piping plover populations, and implementing adaptive management and remedial measures. DFW staff costs associated with overseeing implementation of the Conservation Strategy are included in Table 5-4 (Staff time, coordination and effectiveness and compliance monitoring).

Avoidance and Minimization Measures

While there are many mitigation measures already in place through the Guidelines, implementation of the Plan will require the DFW and plan participants to practice new impact minimization measures in addition to those required under the Guidelines. For example, implementing the conditions on expanded OSV use required under the Plan will require additional staff training, OSV operator education, and additional staff for monitoring of chicks and to smooth out vehicle ruts. Estimated plan participant costs for implementing the Conservation Strategy are provided in Table 5-5. Implementation and reporting costs are separated for plan participants proposing OSV use as a covered activity versus other plan participants, because the costs of impact minimization measures are projected to be higher for OSV escorting.

Table 5-5 Summary of Plan Participant Implementation Costs

Summary of Plan Participant Implementation Costs

Plan Participants without OSV Use					*Plan Participants with OSV Use*				
	Full-time Employees	Rate	Annualized Cost	Cost Over 25 Year Permit Term		Full-time Employees	Rate	Annualized Cost	Cost Over 25 Year Permit Term
Avoidance and Minimization Measures					**Avoidance and Minimization Measures**				
Staff Time per Plan Participant (Implementation, Reporting)					Staff Time per Plan Participant (Implementation, Reporting)				
Beach Manager	0.07	$ 70,000.00	$4,900.00	$122,500.00	*Beach Manager*	0.12	$70,000.00	$8,400.00	$210,000.00
Shorebird/Compliance Monitors/Other	0.3	$7,840.00	$2,352.00	$58,800.00	*Shorebird/Compliance Monitors/Other*	1	$7,840.00	$7,840.00	$196,000.00
Direct Costs		$250.00	$250.00	$6,250.00	Direct Costs		$1,000.00	$1,000.00	$25,000.00
		Subtotal Annualized Cost (Staff)	***$7,252.00***	***$181,300.00***			***Subtotal Annualized Cost (Staff)***	***$16,240.00***	***$406,000.00***
		Subtotal Annualized Cost (Materials)	***$250.00***	***$6,250.00***			***Subtotal Annualized Cost (Materials)***	***$1,000.00***	***$25,000.00***
		SUBTOTAL	**$7,502.00**	**$187,550.00**			**SUBTOTAL**	**$17,240.00**	**$431,000.00**
Contingency			**$375.10**	**$9,377.50**	Contingency			**$862.00**	**$21,550.00**
		Subtotal Avoidance and Minimization	**$7,877.10**	**$196,927.50**			**Subtotal Avoidance and Minimization**	**$18,102.00**	**$452,550.00**
Mitigation					**Mitigation**				
Mitigation Fee (per Take Exposure)[1]		$5,800.00	$5,800.00	$145,000.00	Mitigation Fee (per Take Exposure)[1]		$5,800.00	$5,800.00	$145,000.00
Surcharge on Road Use and Parking		$350.00	$350.00	$8,750.00					
		Subtotal Mitigation	**$6,150.00**	**$153,750.00**			**Subtotal Mitigation**	**$5,800.00**	**$145,000.00**
		TOTAL COST	**$14,027.10**	**$350,677.50**			**TOTAL COST**	**$23,902.00**	**$597,550.00**

[1] This mitigation fee is based on a cost of $1,600 per pair for predator management (based on review of the Bouchard Scopes from 2013–2015 where predator management was in the range of $500–1,500 per piping plover pair). Mitigation necessary for 2.5 pairs is $1,600 x 2.5 = $4,000. Approximately 30% of off-site mitigation funds (or $1,714) will also devoted to covered activities for a total of $4,000 + $1,714=$5,714. This value was then rounded up to $5,800.

Mitigation Measures

The mitigation for this HCP includes a three-part enhanced management program intended to increase piping plover productivity in Massachusetts. These actions include selective predator management; education, outreach, and increased law enforcement; and nesting habitat improvements. DFW staff will coordinate implementation of all mitigation actions. By the end of the permit term, all mitigation projects must be completed.

Estimated annual mitigation costs for plan participants are shown in Table 5-5. These costs include the following components.

- Selective predator management.
- Development and implementation of education and outreach program and materials.
- Increased law enforcement.
- Nesting habitat improvements.

DFW costs for overseeing mitigation implementation are included in Table 5-4. The mitigation cost estimates are based on costs associated with implementation of the Bouchard Restoration Plan (see Chapter 4) and assume that approximately 70% of the mitigation funds will be used for selective predator management, with approximately 30% reserved for other conservation actions such as education and law enforcement.

5.4.1.3 Monitoring and Adaptive Management

As described in Chapter 4, the monitoring and adaptive management program consists of the following components.

- **Compliance Monitoring**: Tracks the status of Plan implementation and documents that all requirements of the Plan are being met.
- **Effectiveness Monitoring**: Measures the biological success of the Plan in achieving desired outcomes and evaluates whether the biological goal and objectives have been achieved.
- **Statewide Population Monitoring**: The DFW will tabulate and quality control check population census data submitted by cooperators (all beach operators, regardless of whether or not they participate in the Plan) and prepare an annual census report that will be used to establish allowable take exposure levels.
- **Adaptive Management**: Responds to unanticipated threats to piping plovers and their habitat and addresses new approaches to ongoing measures that do not meet success criteria.

DFW employees conducting monitoring and adaptive management will plan, coordinate, and report on HCP monitoring. The cost for shared office equipment, GIS and database management, and staff time is included under the program administration cost category and the Conservation Strategy HCP Staff Time category (Table 5-4). The cost of statewide population monitoring is the cost for DFW processing and does not include costs incurred by beach operators and other cooperators in collecting and submitting data as this is an ongoing activity not associated directly with the Plan (see Chapter 2).

The costs of contingency measures are included in this section, because contingency measures are implemented as part of the adaptive management program. Contingency measures take place as a

result of an undesirable response of piping plovers to changed circumstances (i.e., also known as remedial actions) or the failure to meet performance standards (see Section 5.3.2 for a description of changed circumstances). Contingency measures are calculated on the basis of a percentage of the cost of conservation action implementation (5%; see Table 5-4 and Table 5-5). Annualized contingency costs are estimated at $3,434 plus an additional $375–862 per plan participant/year, depending on the types of covered activities being implemented.

5.4.2 Funding

Funding for this Plan will come from two primary sources, the DFW and plan participants. Each of these funding sources is described below.

5.4.2.1 Division of Fisheries and Wildlife

DFW staff are funded through grants, contributions to the Natural Heritage and Endangered Species Fund, the state general fund, and federal funds for certain programs. The DFW spending authority is granted through an annual legislative process, although some funds held in trust may not be subject to annual appropriation. At the beginning of each budgeting cycle, the Department of Fish and Game submits its proposed budgets and spending requests for the Governor's annual budget. The Executive Budget is then reviewed by the joint subcommittees and then the House Appropriations Committee and Senate Finance and Claims Committees for possible revision and eventual passage by both the House and the Senate. Part of the Legislature's budgeting responsibilities includes authorizing the expenditure of federal funds, including grants and appropriations. When the Legislature is not in session, the Office of the Budget reviews and approves spending authority for any new federal funds.

The DFW's funding level is not set by state law, and a portion of funding depends on sufficient General Fund revenues and legislative appropriation. Budget deficits, either due to lower-than-expected revenues or unforeseen increased expenditures in other programs, may require state agencies, including the DFW, to reduce spending below what was originally appropriated. Conversely, for years in which revenues exceed budget needs, the DFW may request and receive additional funds appropriated from the resulting available discretionary funds.

As described above, the DFW will commit an estimated $72,128in staff time and direct costs, on an annualized basis, towards Plan implementation (to be adjusted to account for local inflation over time).

5.4.2.2 Fees and Staffing from Plan Participants

Costs to plan participants will be determined, in part, by the type of proposed covered activity, the number of broods/nests/territories to be exposed to potential take, and the site-specific IAMPs to be prepared by each plan participant. Costs to plan participants will also be affected by whether the plan participant elects to implement onsite mitigation or provide funding for offsite mitigation to be administered by the DFW. For the purposes of the cost and funding model, expected average costs were presented in Section 5.4.1 and are used to estimate Plan fees; actual costs for plan participation will vary based on the variables listed above. All cost components are expected to change over time due to local inflation.

The annual mitigation fee per take exposure allowance will be based on the cost to implement the impact minimization measures and mitigation required under the Plan (see Table 5-5). No DFW administrative costs are taken out of the mitigation fee assessed to stakeholders (however MESA application fees, currently $600 per applicant, will provide modest partial coverage of DFW costs). However, the DFW reserves the right in the future to increase the mitigation fee, as necessary to operate the program, account for inflation, assess administrative costs, and address other changes in cost if alternative sources of funding are not available.

Each site-specific IAMP will contain an annual budget to include the anticipated cost of minimization and mitigation. At least one potential plan participant is a state agency subject to a similar annual appropriation process as described for the DFW above. Most other potential plan participants are municipalities subject to annual appropriation and budgeting processes subject to authorization by town/city councils. The DFW will implement several safeguards to ensure that plan participants have adequate funding in place for a given year's mitigation and impact minimization *prior to carrying out the covered activities for that year*.

Initially, the CMP/take exposure allowance to be issued by the DFW to each plan participant will typically have a 3-year duration, but will require the plan participant to obtain reauthorization from the DFW on an annual basis prior to carrying out covered activities in a given year. Therefore, if the DFW determines that a plan participant has failed to appropriate, budget, or otherwise allocate sufficient funds for their share of Plan implementation for the following year, the DFW will not reauthorize implementation of covered activities for that year.[42]

Second, whenever possible, mitigation to offset potential take in a given year will need to be funded in full or fully implemented prior to carrying out the covered activities for that given year. For example, a plan participant opting to provide offsite mitigation funding will be required to pay those funds into an escrow, mitigation trust fund, or other similar account subject to DFW oversight prior to carrying out covered activities for that year.[43] In the event that a plan participant decides to carry out onsite mitigation, the DFW will ensure adequate funding allocation as described in the preceding paragraph, and will require the mitigation to be carried out before and concurrent with the covered activities whenever practical. For example, selective predator management to offset take in a given breeding season could be carried out from March to May, prior to implementation of covered activities in May through August in the same year.

5.4.2.3 Funding Assurances

The DFW understands the funding requirements and is committed to fund its share of implementation of the HCP for the duration of the permit. This will be reflected in the dedication of staff resources through the DFW's annual budget (to be documented in the HCP annual report), which will continue for the duration of the permit. The funding for the Division's implementation of its responsibilities under the ITP, or a portion thereof, may come from monies appropriated by the MA Legislature on an annual state fiscal year basis for the activities of the Division's NHESP. Because

[42] Similarly, the DFW reserves the right not to reauthorize covered activities in a given year if a plan participant fails to submit satisfactory, timely, annual reports and site plan updates, or in the event of significant permit non-compliance.

[43] The DFW reserves the right to make exceptions in the event of unanticipated circumstances; for example, if piping plovers nest in a major parking lot at a new breeding site.

the availability of such funding is subject to an annual appropriation action by the MA Legislature, the Division does not have the authority to provide an upfront assurance that it has funding for the duration of the ITP. Some of the necessary funding could also come monies deposited into the Natural Heritage and Endangered Species Fund established pursuant to M.G.L. c. 10, §35D (e.g. grants and donations). However, because the amount of monies deposited in this Fund are highly variable and allocated for a range of purposes, the Division is not in a position to provide an upfront assurance that this is an adequate and available source of funding for the duration of the ITP.

As a commitment of this Plan, DFW will incorporate in its annual budget request to the MA Legislature a budget that will be adequate to fulfill its obligations under the HCP and ITP, taking into account other funds that may be available for this purpose in the Natural Heritage and Endangered Species Fund. DFW will provide evidence that it has budgeted sufficient funding for the implementation of this plan, based on appropriations by the Legislature and funds in the Natural Heritage and Endangered Species Fund, by September 30 of each year. DFW recognizes that failure to annually ensure adequate funding to implement the Plan may be grounds for suspension or partial suspension of the ITP. Incidental take authorization under the permit is contingent on demonstrating adequate annual funding for plan implementation. In addition, DFW is responsible for ensuring adequacy of funding of any plan participants that are approved for COI under this plan.

Chapter 6
Alternatives to Take

6.1 Alternatives to Take

The ESA requires that applicants for an ITP specify what alternative actions to the take of federally-listed species were considered and the reasons why those alternatives were not selected. The Habitat Conservation Planning and Incidental Take Permit Processing Handbook (FWS and NMFS 1996) identifies two alternatives commonly used in HCPs: (1) any specific alternative that would reduce take below levels anticipated for the proposed project, and (2) an alternative that would avoid take and, therefore, not require a permit from the FWS. This chapter describes alternatives that follow both approaches.

The proposed action described in Chapter 3 represents the DFW's best attempt to reduce and mitigate impacts on the piping plover population while maintaining and improving the public access, recreational opportunities, and economic activity associated with the state's beaches. In accordance with the ESA, this chapter discusses alternatives considered in the development of the proposed action but that were not selected and the reasons those alternatives were not selected.

6.2 Description of Alternatives to Take

The following three alternatives, called *alternatives to take*, were considered but not selected for analysis in this HCP: no take, reduced take, and activity-by-activity permitting. These alternatives to take and the rationale for their elimination are discussed below. The alternatives to take described in this chapter overlap with, but are different from, the alternatives considered in the EA that accompanies this document. Alternatives to take are designed only to reduce or avoid take, while the alternatives in the EA are designed to reduce effects on the human environment while still meeting the purpose and need for the proposed action (see the EA for details).

6.2.1 No Take Alternative

As stated in Section 1.1.1 *Purpose and Goals*, the purpose of this Plan is to advance piping plover conservation in Massachusetts and to continue to lead species recovery in the state, while maintaining and improving the recreational opportunities and economic activity associated with the state's beaches. Under the no take alternative, the DFW and plan participants would not engage in any of the covered activities that could result in take of piping plover, thereby removing the need for an ITP from the FWS. Under this alternative, beach management and recreational activities would continue to avoid take of piping plovers by operating under the current Guidelines. Adherence to these Guidelines allow beach managers and landowners to manage beaches and beach recreation to prevent direct mortality, harm, or harassment of piping plovers and their eggs.

The DFW is responsible for the conservation, restoration, protection and management of fish and wildlife resources for the benefit and enjoyment of the public. The conservation of Massachusetts fauna and flora is the statutory responsibility of the DFW, including implementing regulatory

protections for state-listed species and cooperating with the FWS on federally-listed species protection, management, and recovery. The agency works to balance the needs of people and wildlife today, so wildlife will be available for everyone's enjoyment today and for future generations. This includes implementing a regulatory approach that achieves necessary endangered species protections, consistent with statute and regulation, while being as responsive as possible to the interests of landowners and managers, and the local communities they are a part of.

Public support for piping plover conservation is integral to the effective long-term management of the state's plover population. Over the last several decades, community and landowner cooperation and adherence to the Guidelines has led to baseline conditions of a large statewide piping plover population. In turn, this has led to greater restrictions on a wide array of recreational and economic activities associated with the state's beaches, which threatens to erode community support for piping plover conservation. This could lead to decreased compliance with the Guidelines and decreased participation in related best practices for piping plover management such as hiring plover monitors, participating in standardized censuses, and reporting population data essential for management. Furthermore, under the no take alternative, the DFW and the FWS could not require beach managers to implement certain proactive measures to benefit piping plovers, such as deployment of exclosures or selective predator management.

The no take alternative is equivalent to the status quo. This alternative was not selected because it would lead to increasing restrictions on beach use and recreation. Furthermore, the no take alternative would not support the DFW's need to balance the management of state resources in conjunction with public enjoyment, could lead to decreased compliance with the Guidelines, and does not provide incentives for certain proactive conservation actions that will be advanced through the preferred alternative. For these reasons, the no take alternative was rejected as infeasible.

6.2.2 Reduced Take Alternative

Under the reduced take alternative, expanded OSV use would not be included in this HCP, thereby reducing the number of take allocations permitted under the Plan. The HCP covered activities would be limited to road use and parking, moving nests, beach raking, and reduced symbolic fending (see Chapter 3, *Covered Activities and Impacts Analysis*, for a description of these covered activities). This alternative would result in 20–50% less take than under the proposed HCP, as fewer piping plovers would be exposed to take from OSV use, and there would be less alteration of feeding and sheltering habitat through destruction of beach wrack and vegetation.

OSV use is currently one of the recreational activities that has been the most constrained by the expanding piping plover population. This is a popular recreational activity that provides important revenue to towns throughout Massachusetts. Excluding this activity from coverage under the Plan is likely to lead to increasing restrictions on reasonable beach use, and therefore has the potential to erode community support for piping plover conservation. As a result, this alternative was not selected as it would not meet the purpose of this Plan to both advance piping plover conservation in the state and maintain and improve the recreational and economic opportunities associated with the state's beaches.

6.2.3 Activity-by-Activity Permitting Alternative

Under the activity-by-activity alternative, the DFW and/or owners and operators of recreational beaches would apply for individual ITPs, as needed, to continue to provide management and

recreational activities with the potential to result in take of piping plovers on the state's beaches. For example, individual beach managers would apply for ITPs for specific activities on their beaches, such as expanded OSV use.

This alternative to take may or may not reduce take of piping plovers as compared to the proposed HCP. If the same towns and other beach managers apply for their own ITPs as would have participated in this HCP, then the level of take would likely be the same or similar to that in this HCP. If fewer towns or other beach managers apply for their own ITP, then the level of take of piping plovers may be reduced as compared to this HCP.

Addressing the covered activities described in Chapter 3 on an activity-by-activity basis would be logistically and economically challenging, both for the DFW and individual beach managers. Under the activity-by-activity alternative, beach managers would incur substantial expense to prepare their own HCP and implement their own mitigation. Similarly, the DFW would need to prepare its own separate HCP for activities on state beaches. This approach would also increase the administrative burden on the FWS substantially when compared with the proposed Plan because they would have to process many individual ITP applications instead of only one. The proposed Plan will coordinate and streamline the permitting process by allowing the FWS to issue the ITP to the DFW, and then the DFW to extend this take coverage to plan participants through COIs.. With this streamlined process, both costs and uncertainties would be reduced substantially as compared to the activity-by-activity alternative, thus ensuring a more efficient use of public dollars.

Activity-by-activity permitting is less efficient for the DFW and the FWS, and lacks a cohesive Conservation Strategy which is biologically inferior to the mitigation proposed in this Plan. For these reasons, the activity-by-activity permitting alternative was rejected.

Chapter 7
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7.6 Chapter 6. Alternatives to Take

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Appendix A
State Guidelines

*[**NOTE TO REVIEWERS:** A PDF of the State Guidelines will be included in the final document prepared for public distribution.]*

Appendix B
Certificate of Inclusion Template

The United States Fish and Wildlife Service (USFWS) issued to The Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife ("DFW") an Incidental Take Permit ("Permit") No. _____, on **[[[Date]]],** for a period of 25 years, pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended, 16 U.S.C. 1539(a)(1)(B). The Permit authorizes the "Take" of piping plover (*Charadrius melodus*) accordance with the terms and conditions of the Permit, and the Massachusetts Statewide Habitat Conservation Plan ("HCP"). Under the Permit, **[[[insert name of Participant seeking the certificate of inclusion]]]** ("Participant") is authorized to perform certain activities covered in the HCP resulting in the "Take" of piping plover, provided all applicable terms and conditions of the Permit and the HCP are met.

As the owner of the property depicted on Exhibit "A", attached hereto and incorporated herein by this reference, you are entitled to the protection of the Permit for the activities authorized by DFW in Conservation & Management Permit No. _____, and associated attachments, including but not necessarily limited to the Impact Avoidance and Minimization Plan and the Mitigation Plan (collectively, "CMP"), issued pursuant to the Massachusetts Endangered Species Act (MGL c. 131A) and its implementing regulations (321 CMR 10.00) ("MESA"), with respect to any Take of piping plover as identified in the HCP. This COI and associated CMP are limited to authorizing otherwise lawful activities. All activities authorized by this COI and associated CMP must be carried out in accordance with all applicable federal, state, and local statutes, ordinances and regulations.

In the event the Participant fails to adhere to the terms and conditions of the CMP, Permit, or HCP, DFW shall take immediate enforcement action to remedy noncompliance, and will have the authority to immediately suspend or revoke the Certificate of Inclusion. The USFWS shall be notified of the suspension or revocation of the Certificate of Inclusion within 5 business days of such action. Such authorization is provided as described in the Permit and the HCP. DFW may also elect to take enforcement action related to MESA, including but not necessarily limited to suspension of revocation of the CMP.

By signing this Certificate of Inclusion, you signify your election to receive Take Authorization under DFW's Permit in accordance with the terms and conditions thereof and in accordance with the terms and conditions of CMP No. _____. This Certificate of Inclusion does not impose additional regulatory control over the signatory nor require the signatory to provide additional information not called for in the Certificate of Inclusion, but instead ensures compliance with 50 Code of Federal Regulations, section 13.25(d).

Coverage under the Permit will become effective upon receipt of the executed Certificate of Inclusion by DFW and Participant. In the event the subject property is sold or leased, the buyer or lessee must be informed of these provisions and execute a new Certificate of Inclusion.

[[[Name of Participant]]]

_____

[[[Cooperator Representative]]] Date

Massachusetts Division of Fisheries and Wildlife

_____

[[[DFW Director]]] Date

Appendix C
DFW Authority

DRAFT dated 6/3/15

Statutory and Regulatory Authority of the Division of Fisheries and Wildlife with respect to the Massachusetts Endangered Species Act and the Federal Incidental Take Permit

1. DFW's Authority to Issue Permits for the Taking of State-listed Species under MESA, and Require Compliance of ITP Conditions by a COI

The Director of the Division of Fisheries and Wildlife (Division) has broad authority under its enabling statute at M.G.L. c. 131 to protect wildlife within the Commonwealth, including but not limited to, "conduct investigations into non-game species of wildlife and wild plants to obtain information relating to population, distribution, habitat requirements, limiting factors, and other biological and ecological parameters deemed necessary to understand the status of such biota and based upon such investigations to promulgate rules and regulations…*listing those species of wildlife and wild plants which are determined to be endangered, and such list shall include, but not be limited to, the United States List of Endangered and Threatened Wildlife and Wild Plants*." (Emphasis added.) M.G.L. c. 131 § 4 (13A). Moreover, the Director has the statutory responsibility for administering the Natural Heritage and Endangered Species Program (NHESP), including promulgating rules and regulations for this program. M.G.L. c. 131 § 5B.

The purpose of the separate Massachusetts Endangered Species Act (MESA) at M.G.L. c. 131A is to protect and foster the continued survival of the Commonwealth's species listed as Endangered, Threatened and Species of Special Concern, *including any plant or animal species "listed under the Federal Endangered Species Act*." (Emphasis added.) See M.G.L. c. 131A § 2. MESA provides in relevant part that "[e]xcept as otherwise provided in this chapter, no person may take…any plant or animal species listed as endangered, threatened or of special concern *or listed under the Federal Endangered Species Act*." (Emphasis added.) Ibid. However, MESA allows the Director to permit the taking of a state-listed species for conservation and management purposes. M.G.L. c. 131A § 3. Finally, MESA sets forth both civil and criminal penalties for the unlawful taking of state-listed species. Civil penalties may include fines and equitable relief such as the restoration of state-listed species habitat where its destruction or modification has resulted in a take. M.G.L. c. 131A § 6.

The Division promulgated regulations at 321 CMR 10.00 to implement the provisions of the MESA statute. Under the MESA regulations, "take" is broadly defined to include the killing or harming of such animals as well as the disruption of nesting, breeding, feeding or migratory activity resulting from the destruction, modification or degradation of their habitat. 321 CMR 10.01. "Take" also includes the killing, collection and picking of rare plants. Ibid.

The MESA regulations provide that any project or activity that will take place in priority habitat for state-listed species, as mapped by the Division, must be reviewed by the Division prior to the commencement of work in the priority habitat. 321 CMR 10.18. The purpose of this review is for the Division to determine whether the project or activity will result in a take of a state-listed species. Ibid. If the Division determines that a take will occur under MESA, the project or activity

must either be modified to eliminate the take or the proponent must obtain a conservation and management permit (CMP) from the Division pursuant to 310 CMR 10.23. More specifically, in addition to showing that the impacts from the remedial action have been avoided, minimized and mitigated, three substantive performance standards must be met in order to authorize a take under MESA:

1. there has been an adequate assessment of alternatives to both temporary and permanent impacts;
2. only an insignificant portion of the local population of the affected state-listed species will be impacted, and
3. a Division-approved conservation and management plan provides for the long-term Net Benefit[44] for the conservation of the state-listed species.

See 321 CMR 10.23(2)(a)-(c).

Under 321 CMR 10.23(3), the Division has the discretion to allow the implementation of an offsite mitigation plan to meet the Net Benefit performance standard, provided there has been a showing that a Net Benefit cannot be provided onsite, and every reasonable effort has been made to avoid, minimize and mitigate impacts onsite. A proponent may demonstrate compliance with the Net Benefit standing by providing for financial or in-kind contributions towards the development and/or implementation of an offsite conservation recovery and protection plan for the impacted species.

As summarized above, the MESA statute incorporates into its protection of rare species those species listed under the Federal Endangered Species Act, and prohibits the take of state-listed species *or* federally-listed species. Moreover, under 321 CMR 10.23(5) of the MESA regulations, the Division Director has broad authority, when authorizing the take of a state or federal listed species through a CMP, to include "such terms and conditions as the Director deems necessary or appropriate to carry out the purposes of M.G.L. c. 131A." The purposes of the MESA statute include determining whether and how to permit the take of a state or federal listed species. Thus, whenever the Division authorizes through a CMP the take of a state and federally-listed species that is also covered under the ITP through the Division's issuance of a Certificate of Inclusion (COI), the Division has the authority to include a condition in the CMP that requires the CMP permittee to also comply with the ITP. Given the Division's broad regulatory authority under MESA to establish the conditions for permitting a take, it is likely that the conditions in the ITP will also as a matter of course be contained in the CMP.

2. DFW's Authority to Enter into Cooperative Agreements, Partnerships, and Permitting Arrangements with the Federal Government

Under MESA statute, the Division Director has "all powers hereunder that exist for purposes of chapter one hundred and thirty-one." M.G.L. c. 131A § 1. The Division's enabling statute, in turn, authorizes the Director to "enter into such contracts as the director, in consultation with the

[44] "Net Benefit" is defined in the MESA regulations to mean (1) an action(s) that contribute significantly to the long-term conservation of a state-listed species, and (2) that conservation contribution exceeds the harm caused by the proposed project or activity. See 321 CMR 10.01.

commissioner, deems necessary or appropriate in order to fulfill the responsibilities and mandates of the agency…" M.G.L. c. 131 § 4(16).